

Recognising the Informal

urban design for environmental
justice in Manshiet Nasser, Cairo

Darcey Bil | Graduation Report



Recognising the Informal

urban design for environmental
justice in Manshiet Nasser, Cairo

Darcey Bil | Graduation Report

Colophon

Darcey Bil
4665791

P5 - Graduation thesis report
January 10, 2025

Delft University of Technology
Faculty of Architecture and the Built Environment
Department of Urbanism

Studio: Planning Complex Cities

First Mentor: Caroline Newton

Second Mentor: Birgit Hausleitner

External Advisor: Rowaida Rashed, Ain Shams
University Cairo, Urban Planning Department

The fieldwork for this graduation project is made possible by the Van Eesteren-Fluck & Van Lohuizen Stichting and FAST University Fund TU Delft.



Table of Contents

Glossary	7
Introduction	9
Chapter 1 Context	10
Urban development	
Environmental Degradation	
Problem Statement	
Chapter 2 Methodology	20
Research aim	
Research Questions	
Theoretical Framework	
Conceptual Framework	
Methods	
Chapter 3 Analysis	36
Cairo spatial analysis	
Manshiet Nasser spatial analysis	
Zarayb fieldwork	
Stakeholder analysis	
Subconclusion	
Chapter 4 Design	96
Vision	
Design goals	
Pattern Language	
Strategy	
Case study	
Assessment	
Chapter 5 Conclusion	140
Conclusion	
Discussion	
Reflection	
Bibliography	154
Appendix	162
Timeline	
Fieldwork preparations & findings	
Maps	
Pattern exploration	

Glossary

A.P.E.	Association for the Protection of the Environment
Al-ashwaiat	Informal areas; Literally haphazard, random
EPC	Environmental Protection Agency
G.C.R.	Greater Cairo Region (Governorates of Cairo, Giza and Qalyobiya)
GIZ	Gesellschaft für Internationale Zusammenarbeit
GOPP	General Organization for Physical Planning
Governorate	Region administered by a governor
Manshiet Nasser	Informal desert squatter settlement next to Moqattam Mount
MHUUD	Ministry of Housing, Utilities and Urban Development
NAC	New Administrative Capital
NUCA	New Urban Communities Authority
SCPUD	Supreme Council for Planning and Urban Development
UDF	Urban Development Fund fka Informal Settlement Development Facility
UHI	Urban Heat Island
UN	United Nations
Wahiya	Middleman for Zabbaleen and Cairenese households
Zabbaleen	Garbage collectors
Zarayb	Neighbourhood of garbage collectors in Manshiet Nasser

Introduction

Cairo like many other major African cities is rapidly urbanising. It increased in inhabitants from 1.5 million in 1947, to 6 million in 1986 (EROS, 2023) to around 20.5 million in 2021 (United Nations, 2021). It housed the main political and economical activity (Kipper, 2009, but with the construction of the New Administrative Capital that is changing. Historically this centralisation of jobs lead to massive rural-urban migration (Kipper, 2009). The lack of affordable housing due to a history of maladministration, counterproductive policies and a centralised governance (Abdelaal et al., 2021; Kenawy, 2016) has led to the construction of informal settlements. The construction of semi-illegal housing mostly takes place on the urban fringes, on private agricultural land and state-owned land (Sejourné, 2009). One of these areas is Manshiet Nasser: a desert squatter settlement in the west of the Cairo governorate dating back to the 1960s. The problems in these informal settlements are varied and relate to physical, socio-economic and environmental challenges (Bakhaty et al., 2023). Due to climate change the environmental stress in informal settlements will increase, leading to more "extreme temperatures, irregular precipitation [...] and persistent drought" (Al-Mailam et al., 2023, p. 1). The consequences especially for vulnerable communities consist of "worsening water scarcity, hindering food security [and] displacing exposed populations" (Al-Mailam et al., 2023, p. 1). Therefore there is a need "to provide a safe, healthy and clean environment for the human and more-than-human actors" (Murdock, 2020) in Manshiet Nasser, where the actors should be the drivers of change.

Keywords - Environmental Justice, informal settlement, Cairo, urban development strategy, human, more-than-human

Chapter 1 | Context

In this chapter Cairo and its population is introduced. It gives an overview of urban development since WWII until now and the challenges related to these developments. This chapter ends with the problem statement and the introduction of the case study location, Zarayb.

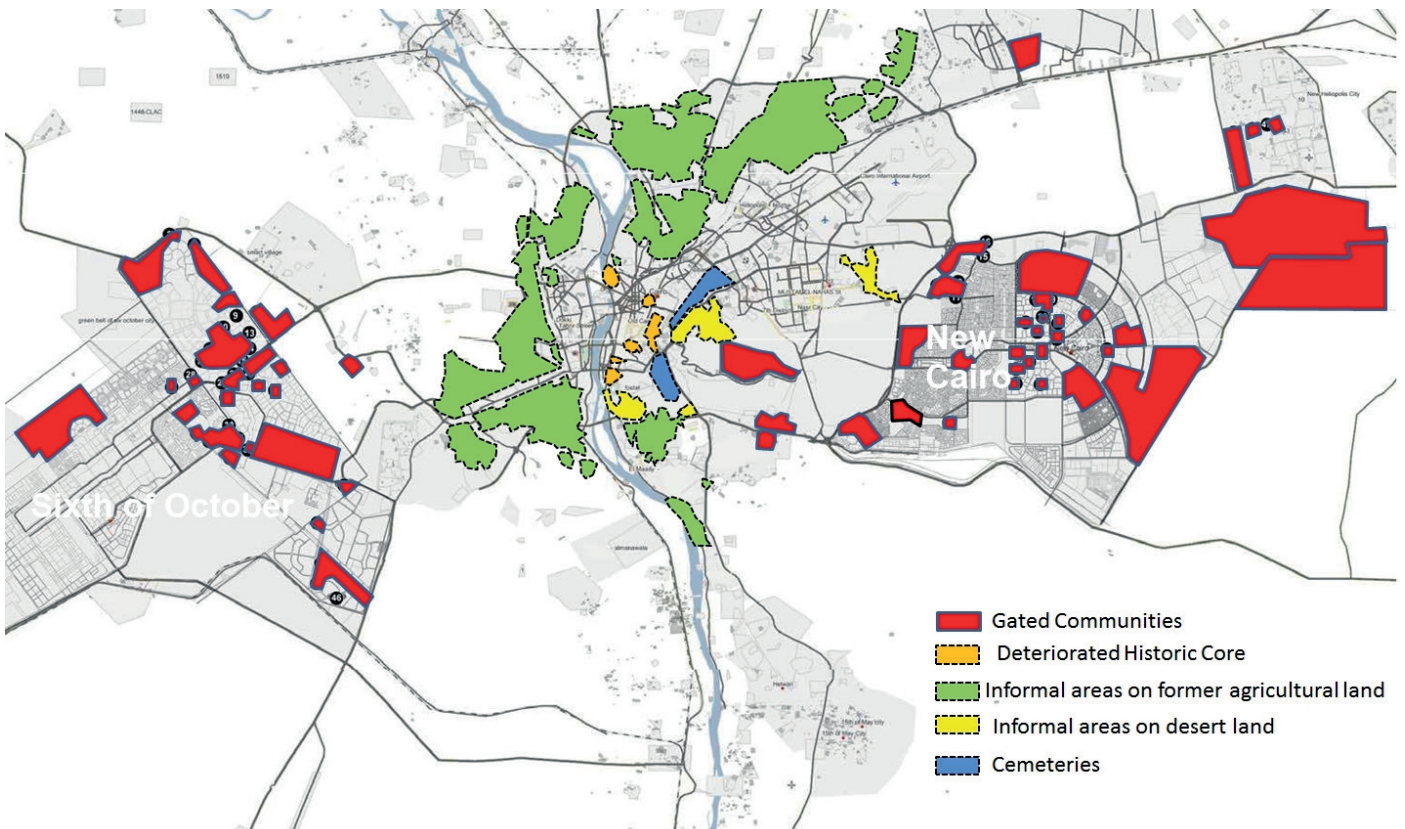


Cairo, the capital of Egypt, is located in the Nile valley. Cairo has a rich history and dates back to 643AD, housing wonders such as the Pyramids of Giza. The Egyptian Arabic name Masr reflects its importance as it refers to the Egyptian nation as a whole (Kipper, 2009). It is the largest city in the country (Kipper, 2009) with a population density over 510 times greater than the national average (Al-Mailam et al., 2023). The population is predominantly Muslim with a significant Coptic Christian minority. Socio-culturally, the city is a melting pot of traditions and has a variety of faces from the winding roads of Islamic Cairo to the squared blocks in Downtown Cairo. Economically Cairo is driven by tourism and manufacturing while facing challenges such as unemployment and inflation (Cousin, 2023). Politically Egypt has a turbulent history that started with the Egyptian Revolution of 2011 against president Hosni Mubarak and that ended with current president Abdel Fattah el-Sisi in 2014.

The population of Egypt has been growing rapidly, with an annual increase of 2.1 percent between 1989 and 2018 (Al-Mailam et al., 2023). This growth has been accompanied by significant rural-urban migration due to the centralisation of jobs (Kipper, 2009). Cairo has seen its population surge from 1.5 million in 1947 to 6 million in 1986 (EROS, 2023), reaching around 20.5 million in 2021 (Nations, 2021). If this trend continues, Egypt is expected to have a total of 160 million inhabitants by 2050, with 75% of them living in mega cities (Al-Mailam et al., 2023).

Urban development

Due to overcrowding and housing pressure, poor and low income families mostly invested their savings in informal land and informal constructions. They resorted to constructing semi-illegal housing on the urban fringes, squatting on state-owned land and agricultural areas. In 1970 around, 84% of the newly constructed buildings were considered illegal (Séjourné, 2009). These areas were named al-Ashwaiat, translated from Arabic to 'haphazard' (Kenawy, 2016). To provide housing for the influx of migrants the Egyptian government started constructing New Towns (Séjourné, 2009). These satellite cities were located towards the east and the west in the desert. In these cities, facilities, housing and industry were segregated and located far away from each other. Sims, as quoted by Elmouelhi (2019), questions these choices as Egyptian urban culture is diverse and compact with shaded space to withstand the harsh desert climate with greenery needing continuous irrigation. Most New Towns have not grown as planned and needed decades to reach acceptable occupancy and functionality (Elmouelhi, 2019). All the while informal settlements continued to densify and grow (Kipper, 2009).



The spatial distribution of different areas in Cairo. (Mohamed, 2015)

This trend of desert urbanisation is still continuing with the construction of New Cairo and the New Administrative Capital with the argument of relieving overcrowding (Elmouelhi, 2019). New Cairo was established in 2000 and is located 40 kilometres from the city centre. This satellite was constructed later, but is located closest to old Cairo. Large companies and institutions, such as Google and the American University of Cairo, have moved their headquarters there. A New Administrative Capital is planned next to it, even though New Cairo is still under construction and a planned green belt has never been realised (Shao et al., 2018). This 2015 plan to move economical and political power out of Cairo towards the desert is being executed right now. The new developments mostly target the high income classes, and plans to include the middle and lower incomes are missing (Elmouelhi, 2019). The Egyptian government is adopting the role of private developers, who have long used exclusivity to promote a new lifestyle in well-maintained gated communities (Almatarneh, 2013).

At the same time public parks, gardens and trees in Cairo are being razed down to make place for commercial development and high ways that are supposed to take travellers to these desert cities (El Rashidi, 2023).



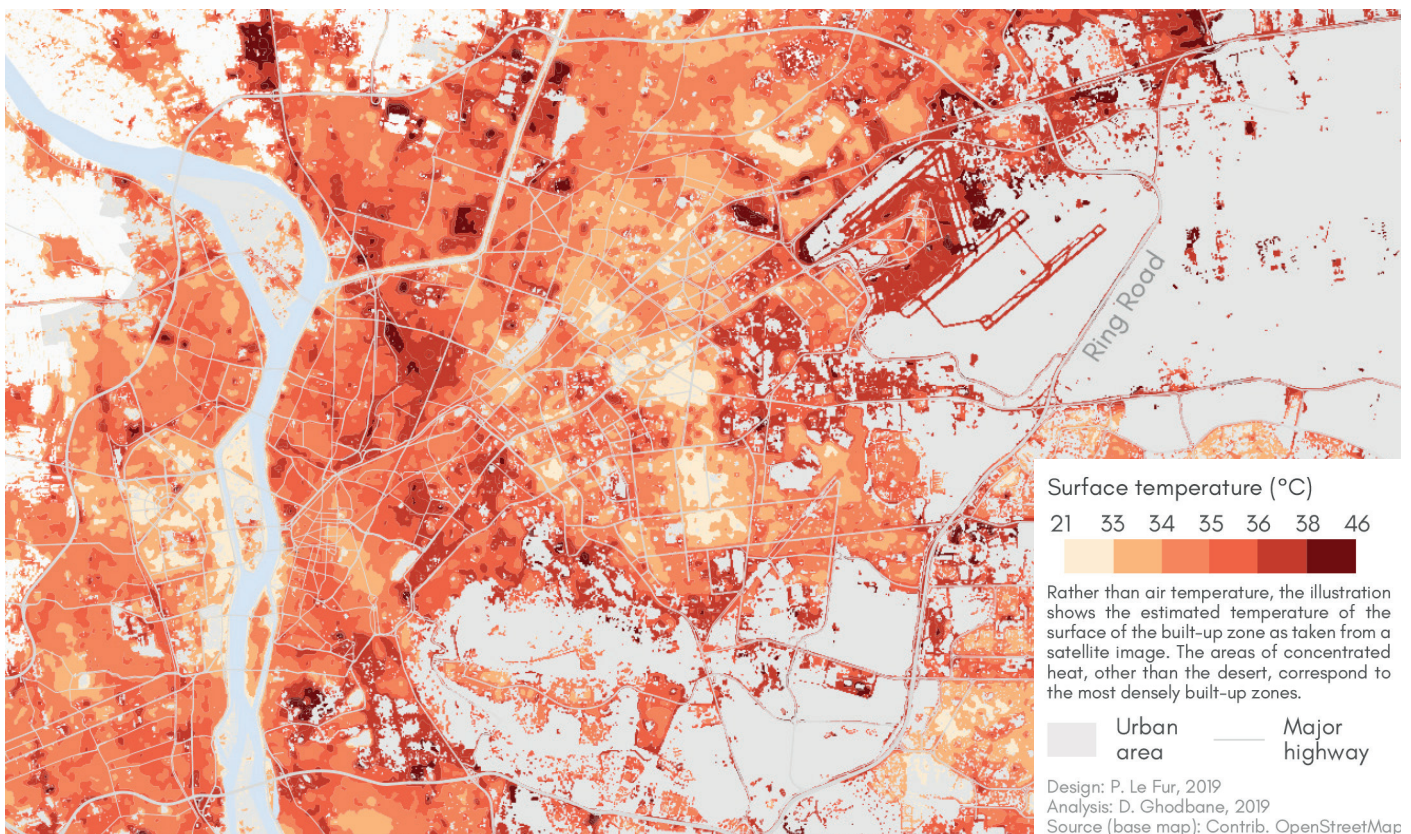
Greater Cairo Region with the New Administrative Capital (Architectenweb, 2021)

Environmental Degradation

Egypt has an arid desert climate with warm summers and mild winters (Al-Mailam et al., 2023). The Urban Heat Island (UHI) influences these temperatures with 2°C during daytime and 4°C during on a monthly average (Khalil et al., 2018). By 2050 estimations are that during the hottest periods, temperatures will not drop below 46°C during the day and 30°C during the night.

Cairo's air quality is defined by the proximity of the desert and the amount of traffic. Fine desert sand mixed with pollutants from exhaust fumes blows into the city, especially during the spring sandstorms known as khamseen (Kipper, 2009).

Vehicles and industries, which are primarily powered by diesel and gasoline, emit pollutants such as NO₂, CO, and SO₂. The presence of vehicles over 25 years old significantly contributes to this problem. Air quality is correlated with population density and pollutant levels, with the worst pollution occurring in spring and winter. During these seasons, climatic and topographical conditions cause winds to weaken to a mere breeze, resulting in stagnant air in the Nile valley (Hereher et al., 2022).



Surface temperature (Ghodbane, 2023)

Rain can clear smog from the city, but precipitation in Egypt is infrequent and scarce, with an annual average of just 33.3 mm (Al-Mailam et al., 2023). Consequently, Cairo is often unprepared for rainfall, leading to muddy conditions and potholes (Kipper, 2009).

The Nile River provides fresh water; however, current water demands are not being met due to increased consumption from desert urbanisation (Al-Mailam et al., 2023). Historically, the Nile's annual floods made the riverbanks fertile for agriculture, but the construction of the Aswan High Dam in 1976 made it possible to build on these agricultural lands (Kipper, 2009).

Agricultural and green spaces have been disappearing due to urbanization, despite their ability to cool down the overheated city (Khalil et al., 2018). These green spaces are making way for large infrastructure to connect old Cairo to New Cairo under the government of President Abdel Fatah El-Sisi. Writer Yasmin El Rashidi describes her childhood neighbourhood of Heliopolis, known for its lush tree-lined avenues designed in the 1920s: "A local heritage protection association estimates that, from 2017 to 2020, approximately 272,000 square meters of green space was lost" (El Rashidi, 2023, para. 4).



Cut-off trees Heliopolis (El-Shahed, 2023)

Problem Statement

In 2023, sixty percent of the inhabitants in the Greater Cairo Region reside in informal settlements, facing complex physical, socio-economic, and environmental challenges. Social segregation is intensifying, as investments prioritize new cities and gated communities for wealthier classes, leaving middle- and lower-income residents in a deteriorating Cairo. Those in these marginalized communities are “disproportionately vulnerable to climate impacts like extreme heat” (Al-Mailam et al., 2023, p. 2) due to limited access to essential resources. Although “all Egyptians will feel the effects of climate change, overlapping societal and economic vulnerabilities will leave those experiencing a combination of gender-based, class-based, and other inequalities at even greater risk” (Al-Mailam et al., 2023, p. 5).

One such informal settlement is Manshiet Nasser, a desert squatter settlement east of Islamic Cairo, located on government land on al-Muqattam Mount. It has a reported area of 5.708 km² and an estimated population of 277,575 (Brinkhoff, 2023), though the actual number may be considerably higher. Despite receiving government and donor support since the 1970s, Manshiet Nasser faces persistent challenges, including rock failure (Gerlach, 2009; Nahla & Hamed, 2020), limited access to services (Kenawy, 2016; Tadamun, 2020), and ongoing environmental hazards and health issues (Fahmi & Sutton, 2010; RT TV-NOVOSTI, 2016).



Skyline of Manshiet Nasser (Cassel, 2015)

Manshiet Nasser is home to a range of communities, but it most famously known for the Zabbaleen, the garbage collectors of Cairo. They recycle around 80% of the city's waste (Fahmi & Sutton, 2010), performing a vital role in Cairo's waste management system. Their local recycling model shows the value of sustainable waste management practices close to home—a powerful incentive for future waste reduction strategies.

For these communities, a response grounded in environmental justice is essential—aiming to “provide a safe, healthy and clean environment for the human and more-than-human actors” (Murdock, 2020, p. 10) of informal settlements, while recognizing these communities as agents of change. The Zabbaleen community in Cairo exemplifies this potential: their recycling efforts reflect the intersection of informality and sustainability, offering an opportunity to explore how environmental justice might be achieved, benefiting not only Cairo's waste systems but also enhancing quality of life.



Street in Zarayb (Elshamy, 2015)

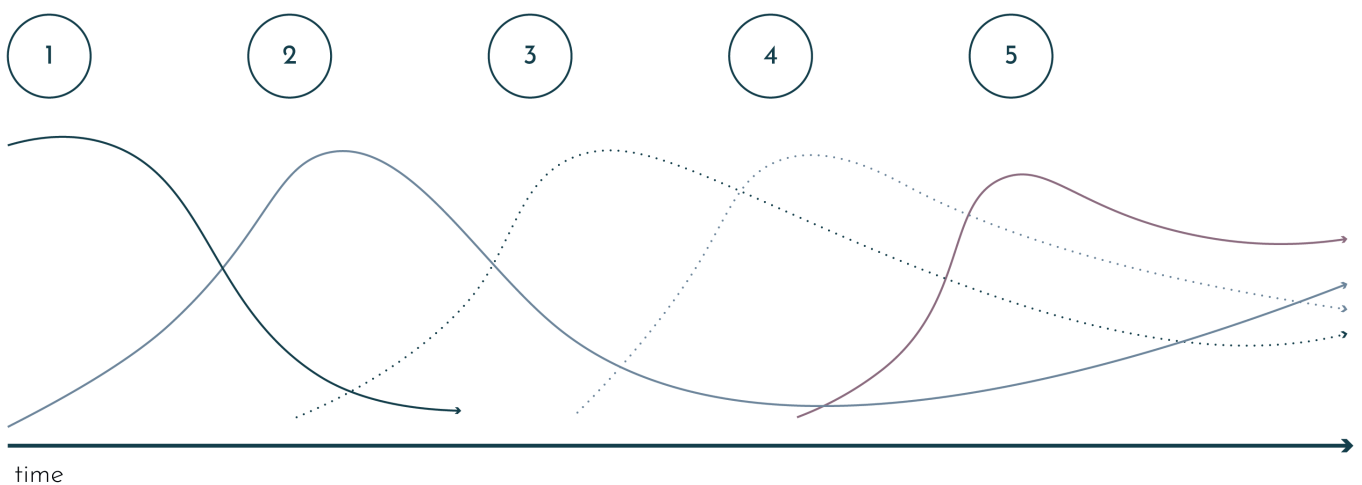
Chapter 2 | Methodology

This chapter outlines the research by stating the research aim and the research questions. It gives context on the main literature in the theoretical framework that were used to create the conceptual framework. The chapter finishes with an explanation of the used methods in the methodological framework.

Research Aim

This research aims to investigate the Zabbaleen and their work in order to make an urban design that aims that environmental justice for the community. By critically analysing the larger context of Cairo and their role within the waste management systems, it is possible to understand the way informality manifests and to make site specific interventions.

The design aims for the concept of ecological succession; small (design) interventions create preconditions for change. The transition towards this future should be just and prevent gentrification by giving voice to the local community and taking their needs into account.



Concept of succession

Research Questions

How can an urban design achieve environmental justice for Zabbaleen community in the informal settlement of Manshiet Nasser in 2050?

Analysis

SRQ1 In what ways is Manshiet Nasser connected to the broader environmental, infrastructural and socio-economic context of Cairo?

SRQ2 What are the routines that shape the daily life of the Zabbaleen community?

SRQ3 How do various stakeholders perceive the living and working conditions of the Zabbaleen community?

Design

SRQ4 How can a pattern language support the urban design in the Zabbaleen community?

- What type of patterns contribute to environmental justice?
- How can these patterns come together in an urban design?

Assessment

SRQ5 To what extent is the urban design appropriate and feasible?

- To what extent do the patterns achieve environmental justice?
- How can the patterns be supported, financed and maintained?

Theoretical Framework

Environmental Justice

The definition of Environmental Justice is taken from 'A History of Environmental Justice' of Murdock (2020, p. 11): "the paradigms of justice are found in the living form of advocacy for clean, healthy and safe environments for all communities, both human and more-than-human."

The way communities combat environmental justice, has its roots in the history of environmental racism (Murdock, 2020). Historically the costs and benefits of development were unfairly distributed and the experience of this injustice form the current resistance and strategies by the communities experiencing it (Murdock, 2020). Consequently, environmental justice is a 'grassroots and people-driven movement' and needs to be participatory. "[...] Community members experiencing the realities of environmental injustice should be the leaders of movements to liberate and heal their own communities." (Murdock, 2020, p. 9). However it is necessary to understand and measure the injustice before intervening, "because one cannot make restitution for an injustice that cannot be measured in some generally agreed-upon way." (Murdock, 2020, p. 11).

Noll & Bahr (2023) built on the notion of assessing environmental justice in the development and implementation of city planning. They developed five urban environmental justice categories that raise related concerns and examples of question that should be asked in the planning process related to these categories. The categories are:



The origin of environmental justice: 1982 protests demonstrations in Warren County against toxic waste landfill site in an African American community (Atwater, 2022)

- Environmental Health, concerns contaminants and health burdens
- Essential Amenities Access, concerns access to water, food, green spaces and health care
- Transportation, concerns the distribution and the access to affordable transportation
- Housing Opportunities & Displacement, concerns affordable housing
- Equitable development, concerns stakeholder engagement and participatory decision making.

Human and more-than-human

The interpretation of human and more-than-human is taken from Henri Lefebvre's *The Production of Space* (1991). In his work he set forward the notion of social space and natural space. He argues that 'social space is a social product' (Lefebvre, 1991, p. 31). Space does not exist in itself, but is formed by society (Schmid, 2008). The theory "[...] systematically integrates the categories of city and space in a single, comprehensive social theory, enabling the understanding and analysis of spatial processes at different levels" (Schmid, 2008, p. 28). In social space Lefebvre identifies three dimensions that shape social space (Lefebvre, 1991):

1. Perceived space (spatial practice), the space that is used on a daily basis for routines and activities
2. Conceived space (representation of space), the space that is imagined by designers, planners and researchers
3. Lived space (spaces of representation), the space that is formed by inhabitants and users

Schmid (2008, p. 37) concludes that from this triad space can be analysed: the spatial practice refers to a 'network of activities or interactions' such as morphology and the built environment; representation of space refers to an 'organizing schema'; and spaces of representation express 'social norms, values, and experiences'.

Natural space on the other hand is the physical space that existed before human interaction (Lefebvre, 1991), e.g. the natural environment. However this space is increasingly transformed through human practices leading to the production of social space. Thus, natural space is not static but is continually shaped and redefined.

Informality

To define an informal settlement is difficult, since scholars lack a universal understanding of this particular urban form. Informality has different appearances in different locations, which make it challenging to attribute an overarching definition that might have social, economic and political implications (Samper, 2023).

Most literature tries to understand informality by comparing it to formality (Samper, 2023). A frequent way to regard informal-formal, would be to define informality as illegal urban development outside of the legal framework (Piffero, 2009; Unceta et al., 2020); the settlement is built disregarding building

laws and regulations. In the case of Cairo illegality then refers to the conversion of agricultural plots into building plots, or to squatting on government owned land. Another way to regard informal-formal, would be to define informality as “places lacking access to faculties of the formal cities” (Samper, 2023, p. 360). This definition is also used by Unceta et al. (2020) who emphasize the (in)access to opportunities. They argue that providing “access to opportunities helps overcome socio-spatial segregation” (Unceta et al., 2020, p. 304) and that certain spatial characteristics allow social, economic or political activity to take place.

However Shehayeb (2009, p. 35) states that “Informal activity is not really ‘outside’ the formal sphere of the state, and should be recognized as intertwined with the state in complex ways.” This is agreed upon by (Sharp, 2022, p. 736) who recognises informality as a “[...] complex power relationship articulated through an unstable political process.” He argues that the power struggle among various actors makes the division informal-formal difficult, highlighting the importance of tracing the political processes that made informality emerge. Often in the relationship of informal-formal, the concept of informality is used by the government to exert control rather than facilitate urban development (Sharp, 2022; Shehayeb, 2009; Unceta et al., 2020). This way of regarding informality actually coincides with the Egyptian Arabic term for informal de-



The difference between formal and informal in Cape Town, South Africa (Miller, 2016)

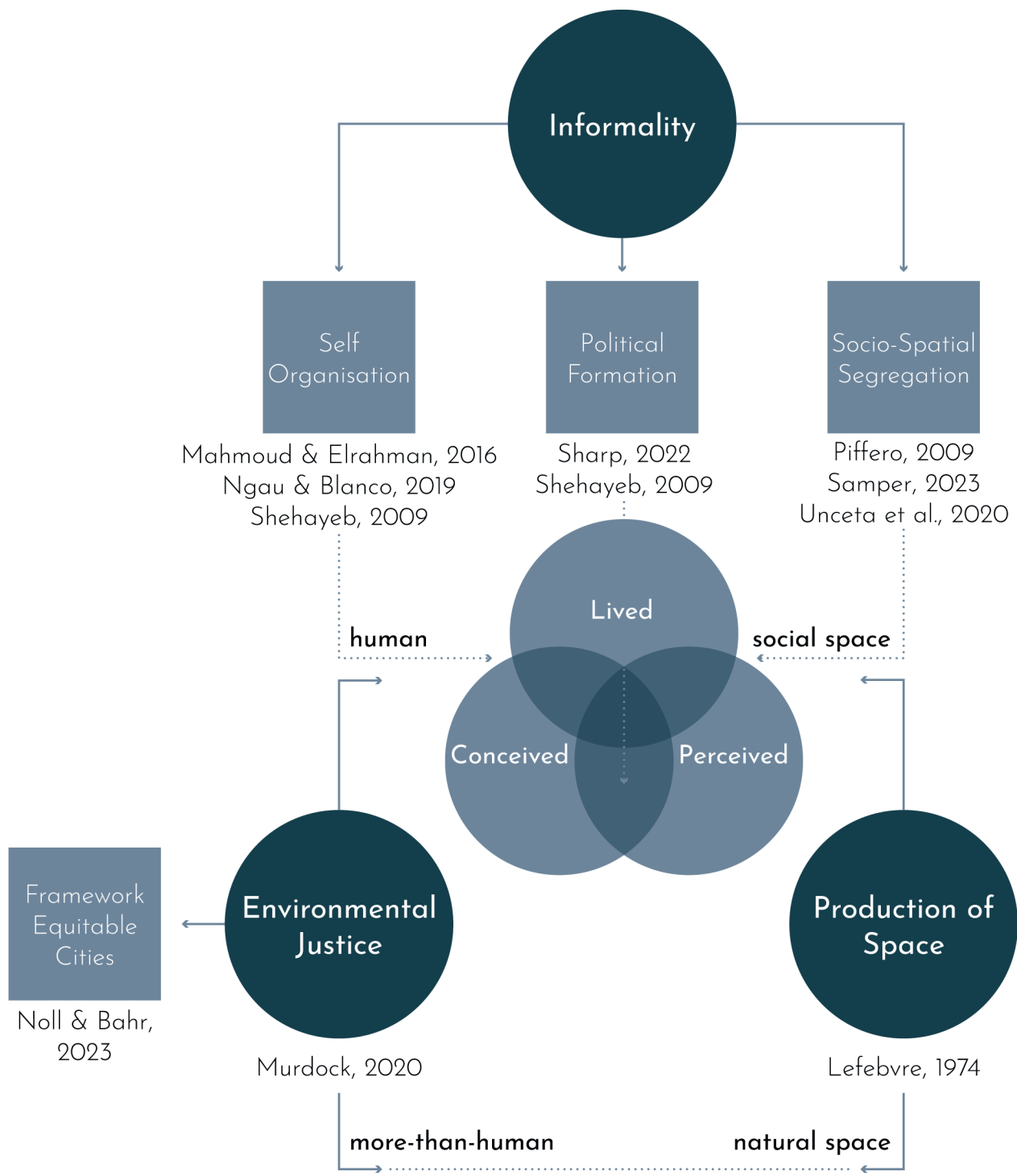
velopment al-ashwa'iyat which literally translates to 'haphazard' (Kenawy, 2016; Sharp, 2022).

Therefore it is important to note that "Informal areas are not unstructured and unorganized; they are not chaotic" (Shehayeb, 2009, p. 35). Informal areas abide by their own rules and mechanism. The construction of these areas are characterised by self-built and resource efficient housing (Vignola, 2022). Interestingly, this approach aligns with the principles of vernacular design, where architecture is rooted in the local environment.

Several scholars have used Henri Lefebvre theory on the social production of space to understand why informal areas function differently than formal ones (Mahmoud & Elrahman, 2016; Ngau & Blanco, 2019). Mahmoud & Elrahman (2016) explain that the lived space formed by individuals is dominant, since they designed the area with their own needs. Mahmoud & Elrahman (2016) explain that conflict arises between the perceived and lived space in government relocation areas, when the needs of inhabitants are not taken into account. This awareness of the social production of space in informal settlements leads to the conclusion of Ngau & Blanco (2019) that the way to inclusive transformation might be flexible spatial solutions to allow inhabitants to have space and place in the city.



Gujari Bazaar in Ahmedabad, India (Pranav, 2013)



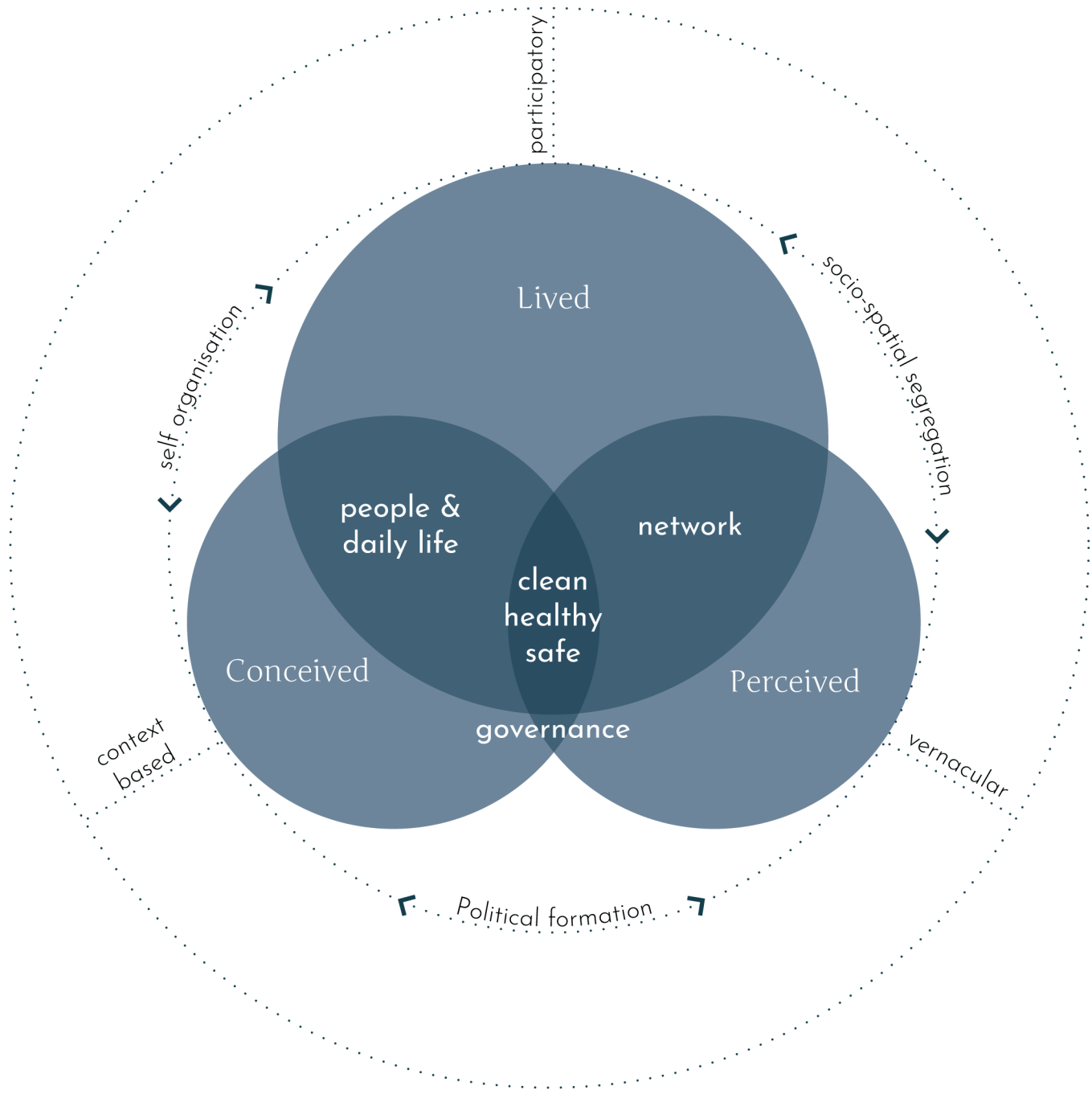
- direct relation
- indirect relation
- Theory
- Findings






Theoretical Framework

It cannot be contested that informal areas struggle with shortcomings in the quality of life. Most shortcomings result from an absence of regulations, which leads to unsafe and hazardous environments, and a lack of support from the government, which does not take care of bigger structures (Shehayeb, 2009). In general these challenges relate to the physical, socio-economic and environmental and involve struggles with low-quality housing, poor quality of life, low-income work and poor sanitation (Bakhaty et al., 2023).

However Shehayeb (2009) argues that problems should be carefully articulated, especially since the origin and course of these challenges are context specific (Bakhaty et al., 2023). Therefore characterising an informal settlement is a necessary step towards effective planning in interventions (Bakhaty et al., 2023). Samper (2023) agrees by arguing that creating data on informal settlements is the first step.

Physical	Social	Economic	Environmental
<ul style="list-style-type: none"> • Unplanned. • Located in areas prone to natural disasters. • Low-quality housing. • Poor urban services. • Poor public spaces. • Poor infrastructure. 	<ul style="list-style-type: none"> • Un-skilled labour. • Literacy. • Lack of health services. • Poor quality of life. • Lack of security. 	<ul style="list-style-type: none"> • Low-income. • Dead capital. • Investment outside the formal economy. 	<ul style="list-style-type: none"> • Poor sanitation. • Poor waste disposal. • Very dense urban fabric reduces natural light and air.



-  Environmental Justice
-  Human and more-than-human
-  Analysis Focus
-  Informal social space
-  Approach

Conceptual Framework

Conceptual Framework

In the conceptual framework the triad of perceived, conceived and lived of Henri Lefebvre is adapted to the context of informality. In this case lived space is more predominant due to the appropriation of space of the inhabitants. Environmental Justice is placed in the middle of the diagram since the goal is to produce a clean, healthy and safe environment; something which should be accomplished in all three elements of space.

The elements of space that 'enable the understanding and analysis of spatial processes at different levels' are adapted from Schmid (2008, p. 28) into network, people & daily life, and governance. By analysing these elements through the scales I can form an understanding of the human space in Manshiet Nasser. This aligns with the theory of informality, which resists a single-dimensional definition, instead containing socio-spatial segregation, self-organization of communities, and the influence of complex political processes. The (spatial) analysis makes it possible to unveil the elements of informality that define Manshiet Nasser, allowing for an effective spatial design intervention.

The lines that connect the human and more-than-human system through the scales are the approaches that drive the design for environmental justice. Participatory design is derived from Murdock (2020), who states that an intervention should be people driven. Participatory design makes it possible for people to liberate and heal their own community. This is related to lived space, the space formed by inhabitants and users. Context based design is needed to respond to the local informality. This relates to conceived space, the space that is imagined by designers, planners and researchers. Vernacular design can be rethought to respond to the natural environment in a fitting way with modern solutions. This relates mostly to perceived space, the space used on a daily basis for routines and activities.

Methods

According to Samper (2023, p. 361) “the mapping of [informal settlements] can be divided into five methodologies: community mapping, single case selection, national indexes, remote sensing, and urban morphologies”. In this thesis methods (1), (2), (3) and (5) will be used to a certain extent. (2) and (4) both involve detailed mapping using aerial photography and remote sensing, which is outside the scope of this thesis. However (2) single case selection will be used for a case study for the urban design.

Literature review

In the literature review scientific articles, books and news articles are collected to form the theoretical framework and find information on the problem of informality in Egypt and possible solutions. These form an input for the stakeholder analysis, development of the pattern language and the assessment of the extend of Environmental Justice.

Mapping & QGIS

Mapping is used to make a spatial analysis of Cairo, Manshiet Nasser and their relation through the scales. Mapping on the larger scale is done with QGIS data and Open Street map. Informality usually lacks reliable (spatial) information, since the settlement is not officially documented and continuously changing. Therefore, mapping on the smaller scale is done with satellite images from Google Earth and ESRI imagery. In addition to this, soft maps are formed

	Analysis			Design		Case Study		
	Literature Review	Mapping & QGIS	Stakeholder Analysis	Pattern Language	Research by Design	Fieldwork	Environmental Quality Survey	Workshop
SRQ1	x	x						
SRQ2	x	x				x	x	
SRQ3	x		x			x		
SRQ4	x			x	x			x
SRQ5	x					x		x

by interviews and the site visit to form an image of people and everyday life in the settlement.

Stakeholder Analysis

The stakeholder analysis maps the different actors involved in the urban development process, as well as their power, interest and mutual relations. The goal is to understand the problem perception of stakeholders in order to activate them in the planning and execution process.

Pattern Language

Pattern Language is a method developed by Christopher Alexander in 1977 to create a system of design principles based on recurring and context-specific solutions to common problems in the built environment. Each pattern describes a relation between theory and design related to the overall topic of the pattern set. All these patterns are related, forming a language that can be used by designers as well as other stakeholders to design urban spaces. In my case, the theory was derived from literature reviews and fieldwork observations. Since participatory, context-based and vernacular design are the approach to designing for environmental justice in informality, the patterns are related to one or more of these approaches. I designed by patterns in the form of a card as a small communication tool based on Bechmann (2023). The front side explains the pattern in a nutshell, the backside contains more information on the theoretical background, practical implication and assessment.

Research by Design

Research by design is used to explore the combination of patterns in a possible intervention. This is done in the workshop with inhabitants and by myself. It involves sketching, modelling, and visualising.

Fieldwork

Data on people, everyday life and work in Manshiet Nasser is gathered through observations and interviews during fieldwork. This will involve photography to compare the analysis and the design to on the ground experience. Interviews will be conducted with experts on informality and environmental challenges in Egypt, as well as inhabitants.

Environmental Quality Survey

An environmental quality survey is a subjective way to assess environmental quality using various indicators. The EQS used in this thesis is based on an example by the Field Studies Council (FSC, n.d.) that uses a bipolar scale from 1 to 5, indicating a range from poor to good quality. The topics addressed in the EQS relate to buildings, traffic, greenery and overall quality.

Workshop

A collaborative workshop is set up to create participation in the design process of this project. The involved parties will be the residents, the researcher and a translator. The goal of the workshop is to draw or create a design collectively using a map, patterns, or small 3D interventions.

2 | Methodology

How can an urban design achieve environmental justice for Zabbaleen community in the informal settlement of Manshiet Nasser in 2050?

Reflection

3 | Analysis

SRQ1 In what ways is Manshiet Nasser connected to the broader environmental, infrastructural and socio-economic context of Cairo?



Analytical maps
Review results

SRQ2 What are the routines that shape the daily life of the Zabbaleen community?



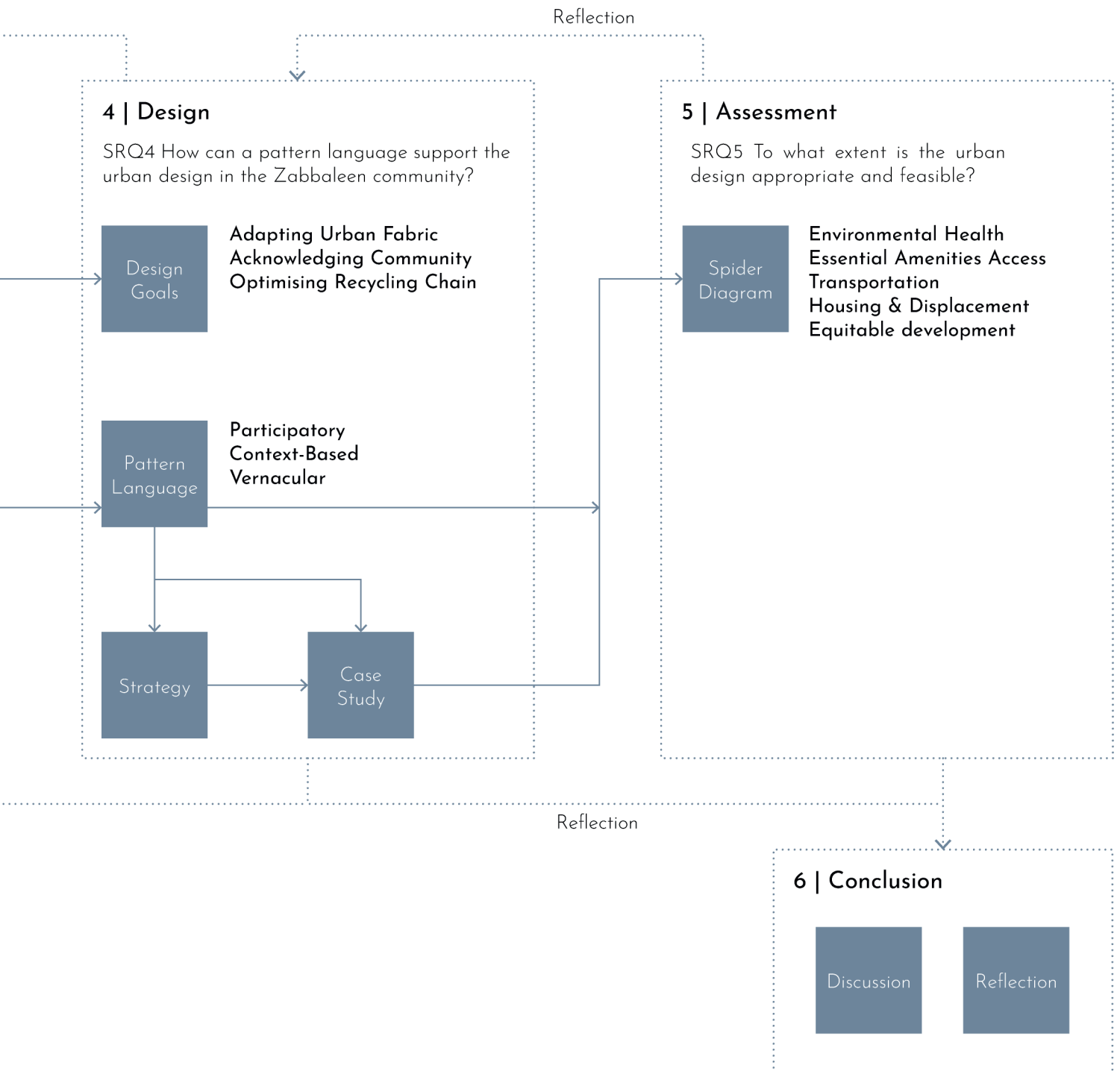
Analytical maps
Storyboards
Waste system

SRQ3 How do various stakeholders perceive the living and working conditions of the Zabbaleen community?



Stakeholder positioning
Stakeholder mobilisation

Reflection



Methodology Flowchart



Chapter 3 | Analyses

This chapter addresses the first three sub-research questions focussing on the analysis of Zarayb. This is used to understand the place within the system of Cairo and to understand the extend of environmental (in)justice before intervening.

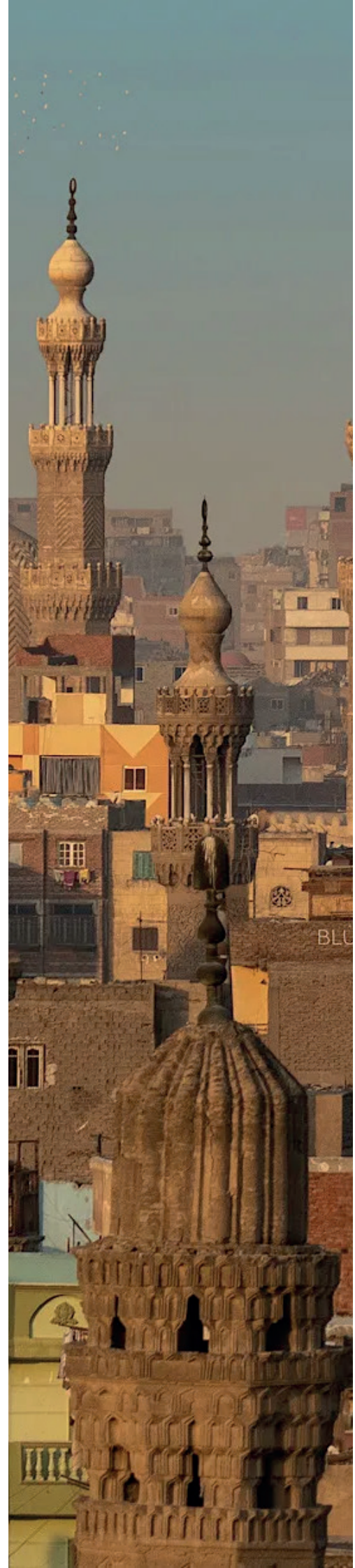
First the spatial analysis of Manshiet in Cairo (1:50,000) shows the environmental, infrastructural and socio-economic context; Secondly, the spatial analysis of Manshiet Nasser (1:15,000) shows the urban development, the infrastructure and the socio-economic aspects.

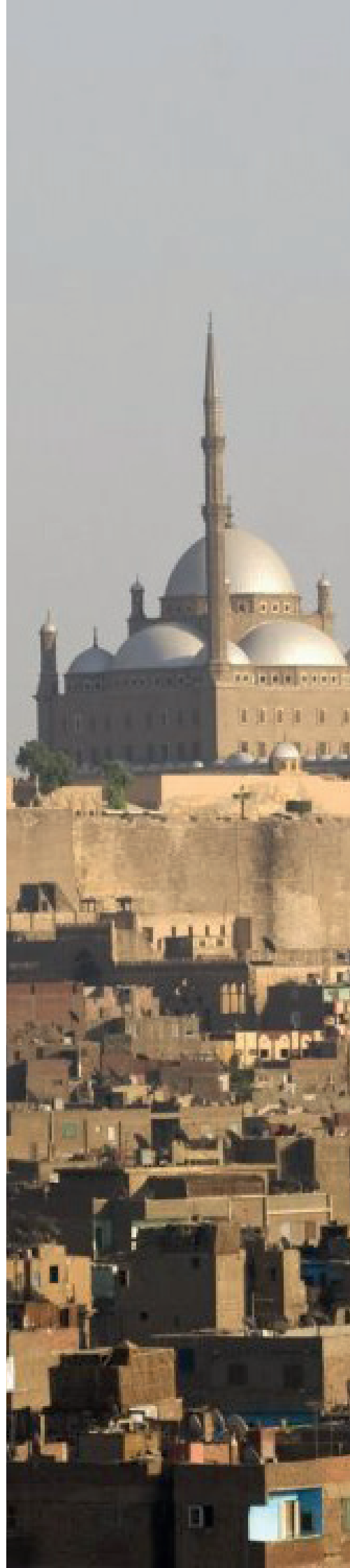
Then the analysis zooms in on Zarayb and the Zabbaleen community through Fieldwork during a site visit. It illustrates the inhabitants of the Zabbaleen community, their urban environment and their involvement in the waste management system of Cairo.

Lastly, the stakeholders are introduced and their stance on the Zabbaleen community.

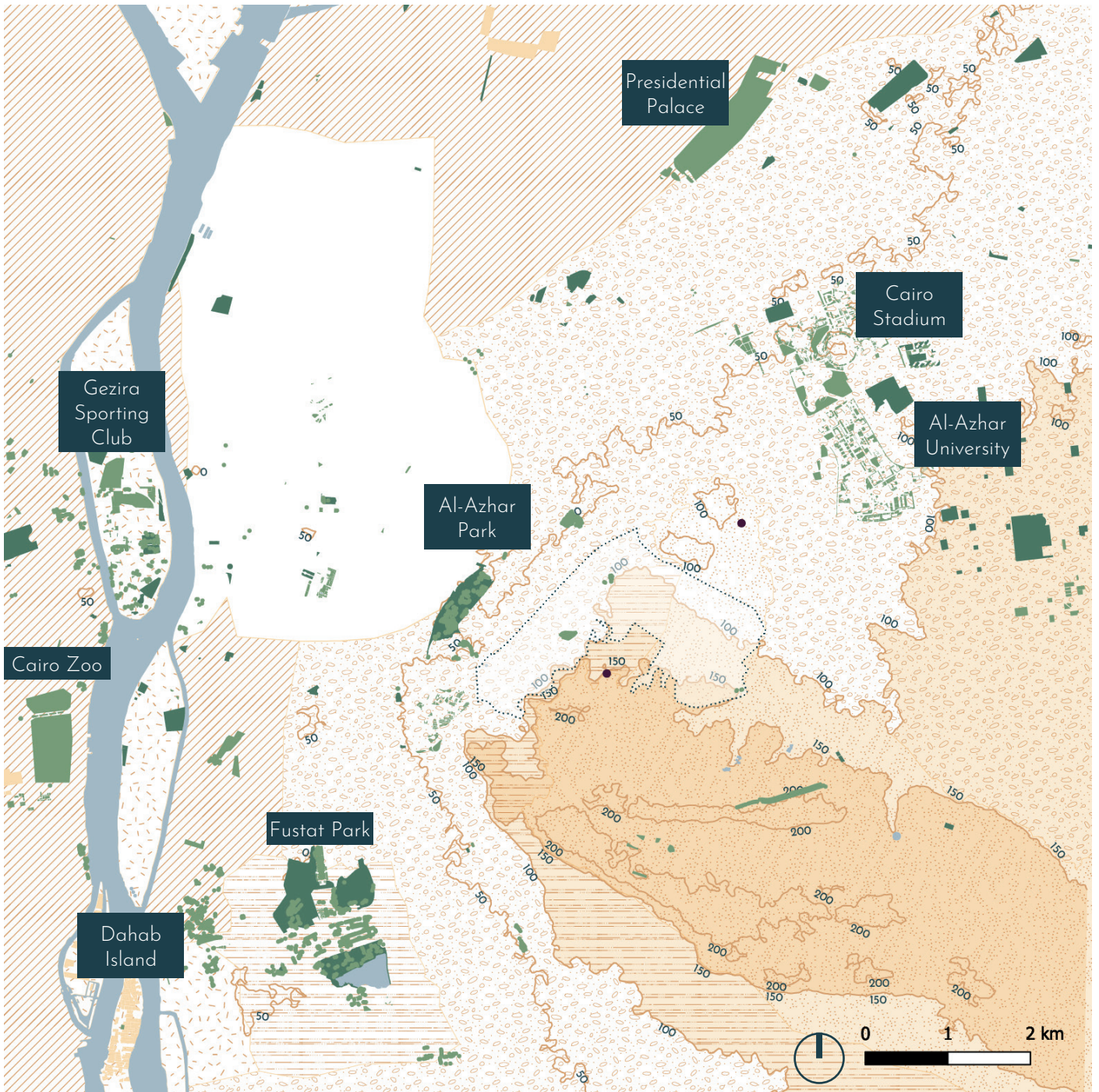
Next page from left to right

Great Pyramid of Khufu (Desouki, 2023), Nile river (Zeneiny, 2023), Islamic Cairo (Blue Cairo, 2021), al-Azhar Park (Sites International, z.d.), Zarayb (Migné, 2022), Citadel of Saladin (Davies, 2024)





Cairo | Environment



Natural conditions (Map data from OpenStreetMap & Google; H. M. Hassan et al., 2020)

Legend

- | | | |
|--|---|--|
|  Water |  Fill ground |  Peak |
|  Grass |  Clay |  Contour interval 50m |
|  Park |  Nile deposits | |
|  Agriculture |  Sands and gravels | |
|  Tree |  Limestone | |
| |  Sandstone | |

Geology

The geology of Cairo itself reflects the presence of the Nile and desert. The city's foundations lie in Nile floodplains, where clay deposits fertilised the soil. Islamic Cairo sits atop an ancient fill layer developed through continuous (re) building. Moving from the Nile towards the desert, the soil shifts to sands and gravels, indicating the arid eastern border. The Mokkattam Plateau to the east consists of the sedimentary rocks sandstone and limestone, but not very fertile though limestone contains high amounts of minerals. This topographical variation is visible in elevation differences: while the Nile Valley averages around 50 meters, heights increase up to 200 meters on the plateau (H. M. Hassan et al., 2020).

Natural Ecology

Cairo's biodiversity and landscape are tied to geology of the Nile River and the Eastern Desert. The city lies at a border between the Nile Valley to the south and the Nile Delta to the north, both of which are known for their fertile alluvial sediments that support extensive biodiversity and are well-suited for agriculture (Amer, 2018; Séjourné, 2009). Along the natural Nile, the flora comprises a variety of aquatic vegetation, hydrophytes, algae, terrestrial annual weeds, and a cultivated canal bank with shade or windbreak trees (Amer, 2018). However, the Nile's ecosystem also faces invasive species, with the Common Water Hyacinth and the Louisiana craw fish being the most disruptive. In the East Desert, the climate shifts to arid, where biodiversity is limited by harsher conditions. This desert's water resources primarily derive from rainfall in the south, transported downstream by the Nile (Amer, 2018). The landscape is largely gravel desert, characterized by sterile soils except where sand depth is sufficient to support some annual and xeric woody species (Amer, 2018). Vegetation here includes plants adapted to arid conditions, with major plant families such as Daisies, Grasses, Crucifers, and Goose foots flourishing in soils with specific salinity, water retention, and nutrient characteristics (El-Amier & Abdulkader, 2015).

The natural ecology of Egypt was especially used in the landscape design of al-Azhar park: the largest green space in Cairo with around 300,000m². Once a neglected dump-site, it underwent extensive clean-up, debris removal, and regrading. Plant nurseries were established to identify species suited to the soil, terrain, and climate. The design integrates elements of traditional Islamic gardens, including geometric patterns, sunken gardens, and orchards, with views and pathways connected to nearby neighbourhoods. Soil improvement involved removing and treating existing soil, adding a new topsoil layer, and installing an underlying clay layer to retain water and prevent erosion. Planting focused on native and adaptable species, chosen to offer shade and withstand the climate and is irrigated with Nile water. Al-Azhar Park's vegetation ranges from dry, erosion-resistant succulents on the western slope to lush, grassy meadows, formal gardens, and orchard-like spaces (Labib, 2017; Mostafa & Kamel, 2013; Sites International, z.d.; Stino, 2013). An overview of native plant species suitable for the arid climate can be seen on the next page.



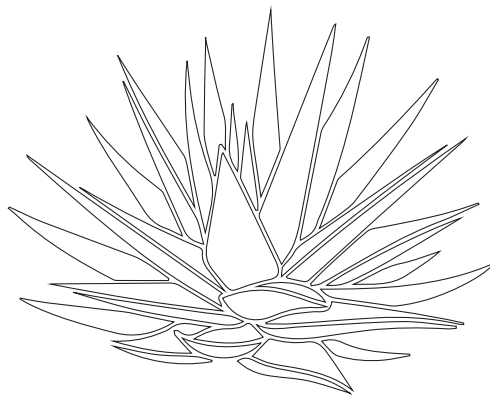
Date Palm



Sycamore



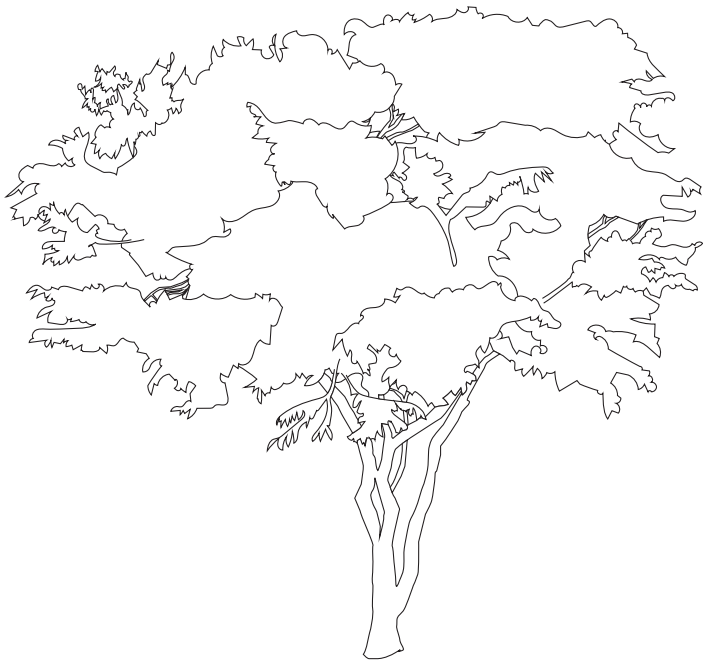
Bamboo Palm



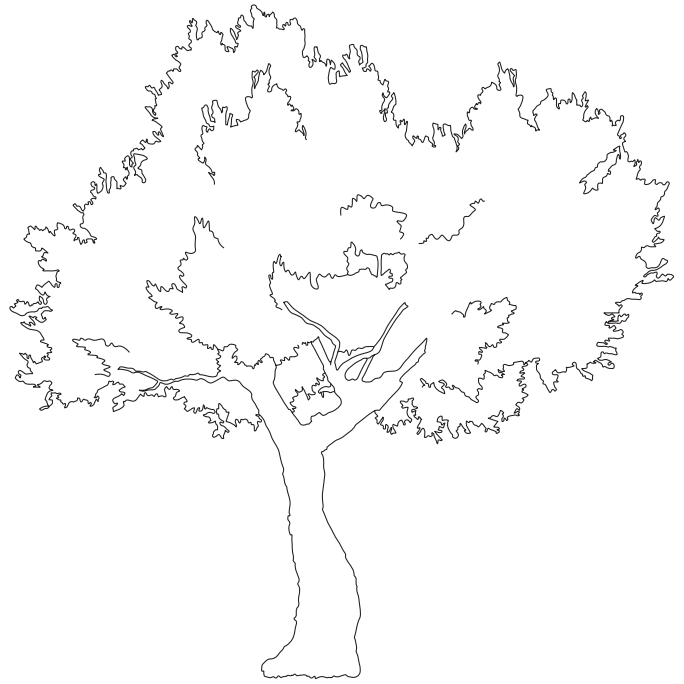
Succulent
Aloe Vera



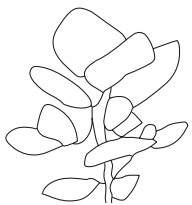
Succulent
Yucca



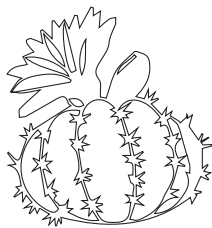
Acacia



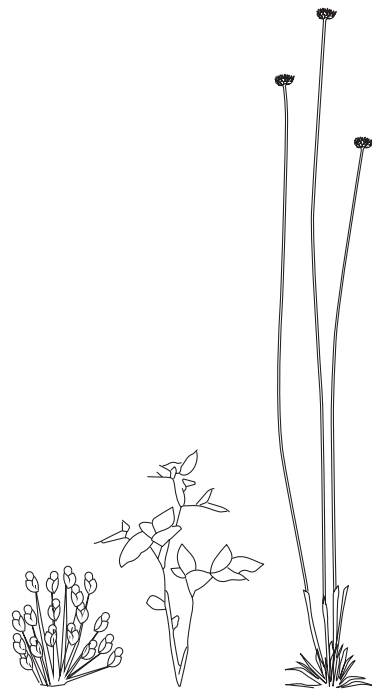
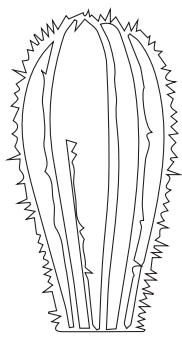
Olive Tree



Succulent
Kalanchoe



Succulent
Cacti



Ground covers
Chrysanthemum

Urban Ecology

The urban environment impacts wild plant life with pollution, disturbance and site isolation (El-Ghani et al., 2011). This new urban environment has high species diversity due to diverse habitats and alien species.

El-Ghani et al. (2011) researched urban ecology in desert urbanisation surrounding Cairo. They found that 5 primary habitats exist: desert, wastelands, home gardens, public gardens, and lawns. The home gardens, public gardens are “managed ecosystem” since they are impacted by human activity (El-Ghani et al., 2011, p. 606). The frequent and varied disturbances, such as mowing, planting and maintenance, actually increased (annual) plant species. Home gardens in Egypt are primarily used for shading and are particularly rich in plant species, including many weeds found in arable lands resembling neighbouring cultivated lands.

The desert and wasteland habitat showed similar species count as inner cities, which suggests high levels of disturbance in the desert. These areas were mostly dominated by perennial plants. Urban open spaces like roadsides and railway edges help plants spread into desert areas and let some desert plants move into the city. This creates mixed plant life at the city borders, where less competition helps these plants grow.

Green Spaces

Despite Cairo’s diverse ecological fabric, access to green space is highly limited, especially in densely populated areas. Defined as vegetated open spaces, Cairo’s urban green spaces include both public (parks, green corridors, residential green areas) and private (club grounds, universities, museums) spaces (Aly & Dimitrijevic, 2022). However, the availability of these green spaces is severely below standards; by 2020, public green space per person dropped from 0.87m² to 0.74m², far below the World Health Organization’s recommendation of 9m² per person, as well as Egypt’s National Organization for Urban Harmony’s target of 5-7m² (Aly & Dimitrijevic, 2022).

Green space distribution is also uneven. In 2020, 22 out of 37 districts—home to 66% of Cairo’s population—provided less than 0.50m² of green space per person (Aly & Dimitrijevic, 2022, p. 6). In districts like Manshiet Nasser, green space falls under this threshold, lacking even public parks. The closest green space is Al-Azhar Park, however, physical and urban barriers mean it remains a 30-minute walk or a 10-minute drive for Manshiet Nasser residents. Meanwhile, wealthier areas, such as the villa districts on the Mokkattam Plateau, enjoy a better green space ratio of 1.50 to 3.00m² per person, underscoring the disparity in urban green resource allocation across Cairo.

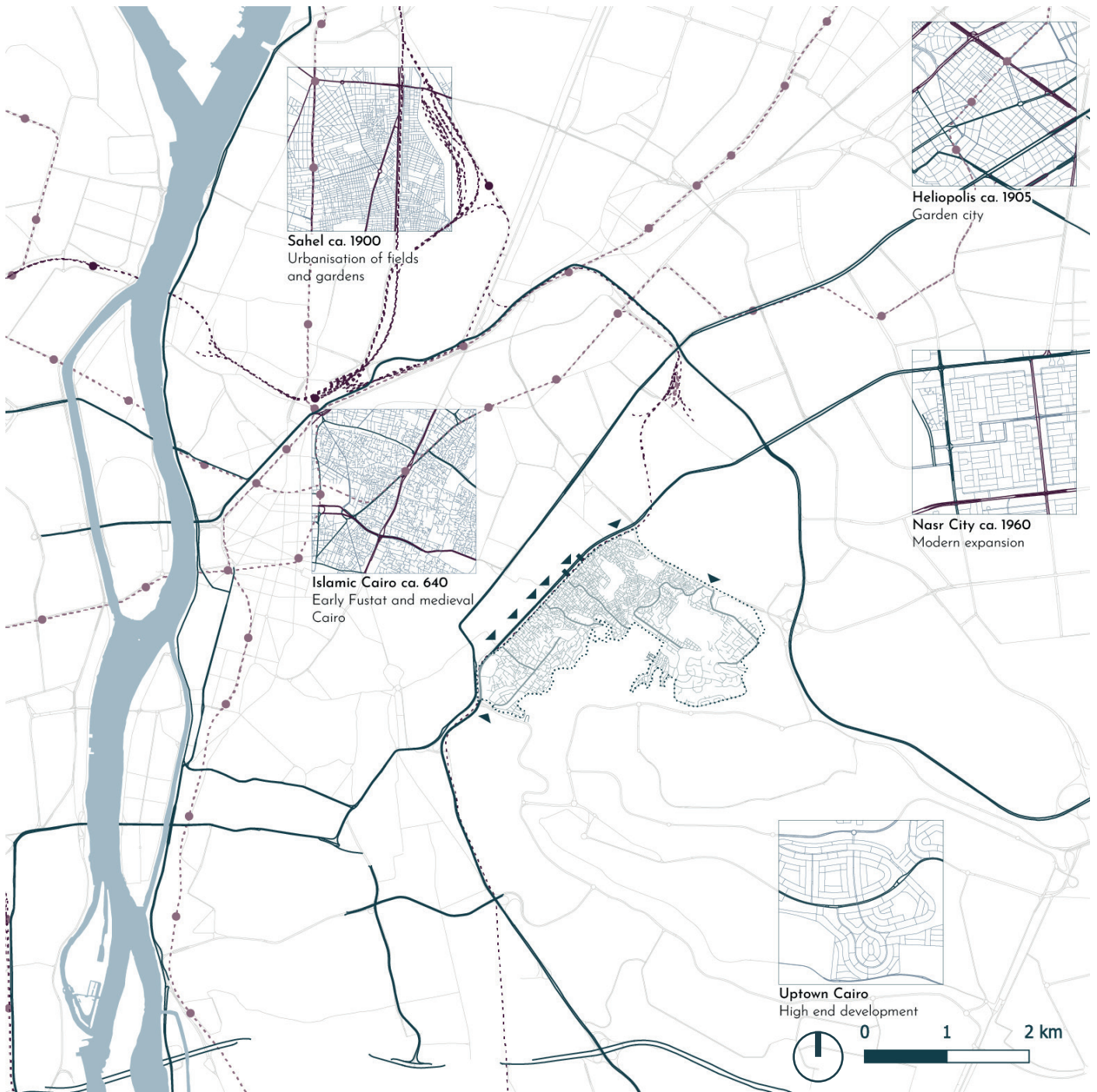


Al-Azhar Park (Sites International, n.d.)



Eastern Desert in New Cairo (Zwangsleitner, 2014)

Cairo | Infrastructure



Roads and public transport (Map data from OpenStreetMap)

Legend

- Primary road
- Secondary road
- Tertiary road
- Train
- ... Metro
- Train stop
- Metro stop

Roads and public transport

The road and public transport network are the most dense in the historically developed parts of Cairo. The car is the main mode of transportation despite the efforts to expand public transportation, like the expansion of metro line 3 (European Investment Bank, 2016). Besides private cars, services like Uber, taxis and micro buses offer alternatives rides. For the last two, it requires users to know fares in advance, as they often lack standardized pricing and can lead to overcharges if not carefully negotiated (Elcheikh, z.d.).

The city's public transport, particularly the metro, faces challenges with reliability and reputation. However, safety improvements have been introduced, such as the designation of women-only cars to enhance security for female passengers, an effort that responds to long-standing concerns about harassment (Elcheikh, z.d.).

Neighbourhoods

In the map on the left five different types of neighbourhoods are selected that reflect different urban design over time.

Islamic Cairo is the oldest part of Cairo, stemming from 640 AD. It consists of narrow and winding streets, ranging from 6-7m in major streets and 2-3m in minor streets (A. Hassan et al., 2015). Historically Islamic cities have high density, low rise and mixed functions. The ground floor is used for commercial activities, while the other levels are residential (A. Hassan et al., 2015). The urban fabric has a repeating pattern of "enclosure and inclusion" (Bianca, 2000) with main urban elements like mosques, markets and residential clusters around dead-end alleys. Dead-end alleys helped residents to monitor their neighbourhood and provided semi-public/ semi-private areas in the Arab Muslim community (A. Hassan et al., 2015). It is also here that traditional Arab houses can still be found. These houses were formed around the courtyard, which has a social, climatic and symbolic function: it protects the privacy of the family, giving space especially to women; it cools down the house at night; and the fountain with a reflection of the sky symbolised the cosmos.

Neighbourhoods like Sahel, constructed during the first expansions between 1850 and 1925, also have a close-knit network. The residential areas were built on cultivated fields and palatial gardens, which is still reflected in the urban fabric nowadays.

The urban fabric of Manshiet Nasser mostly reflects the narrow and winding streets of these historic parts.

Heliopolis was the first desert expansions built on European principles under British colonial rule in 1920. Designed as a garden city with avenues, boulevards and streets, a tram line as part of a massive transit systems and many gardens (Mourad, 2017). However, little remains of these green spaces, since the rule of President El-Sisi. Historical and protected sites have been transferred to the military and developed for economical gain (El Rashidi, 2023).

Nasr City was planned in 1958 by the military regime, which used building and development projects to validate their rule. It was constructed according to modern design principles. It has an orthogonal grid and super blocks with apartments, services and green space (Elshahed, 2015).

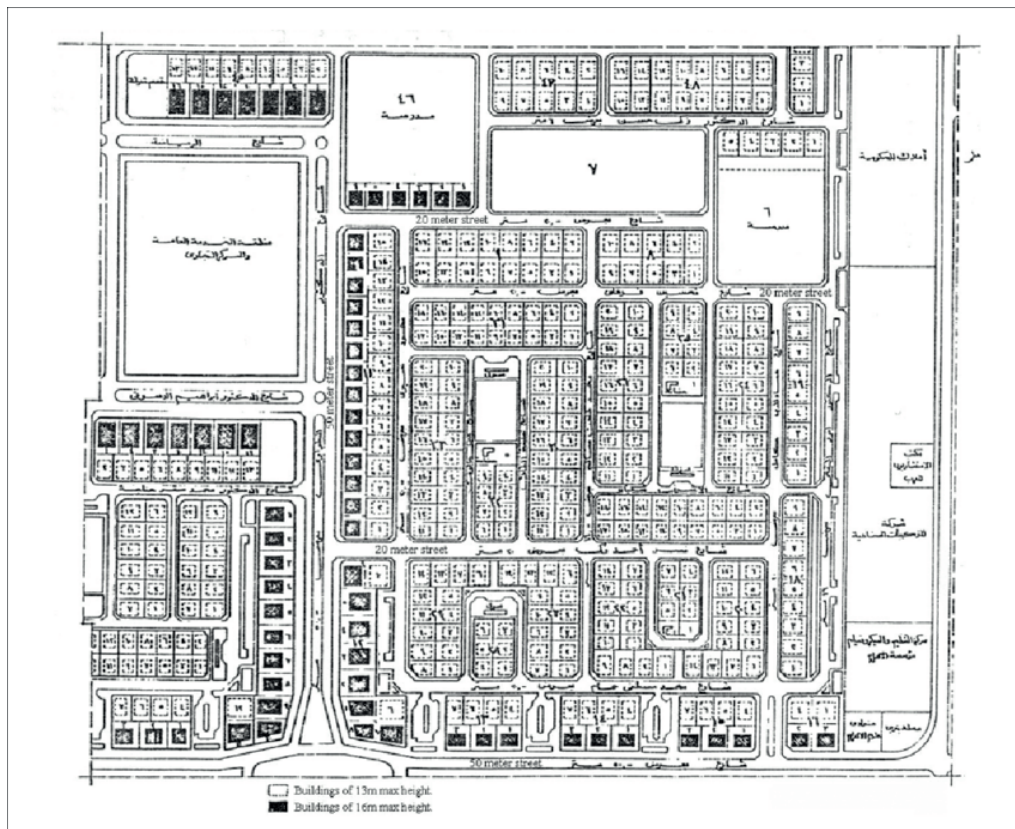
The development of Uptown Cairo signifies the recent trend of private development of gated residential communities (Almatarneh, 2013). These developments range from middle class to high end, and advertise a lifestyle 'free of problems'. Exemplary in this case is the promotion of Uptown Cairo, in which the appearance of Manshiet Nasser in images and city views is deliberately taken out (Tadamun, 2020).



Abd el Moneim Riad Square (Degner, 2017)

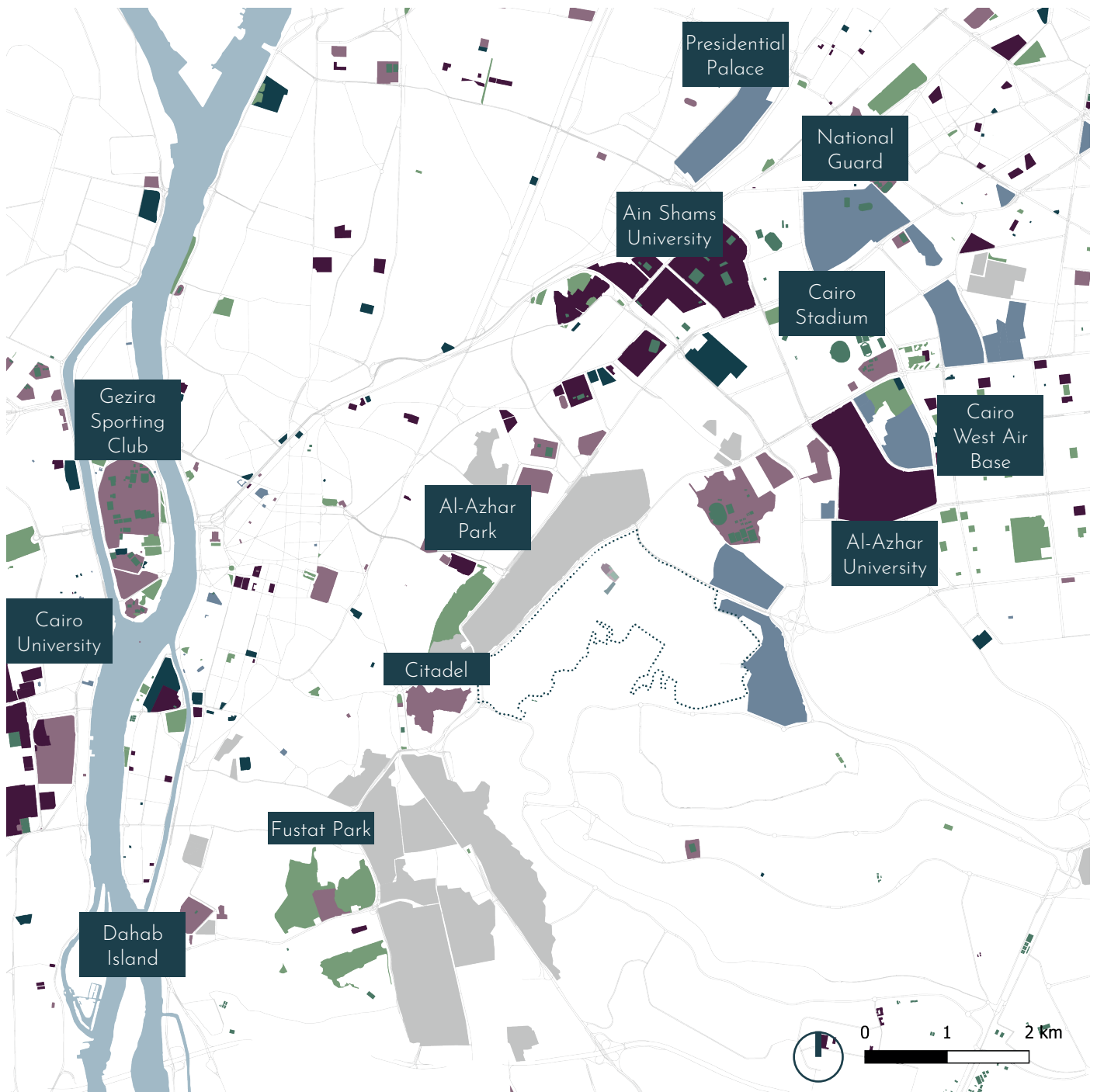


Historical map of Islamic Cairo around al-Muizz Street (Necipoglu and Roxburgh, 2019)



Planning of Nasr City in 1956 (Selim, 2015)

Cairo | Socio-Economic



Facilities (Map data from OpenStreetMap & Google)

Legend

- Hospital
- School/ University
- Park
- Sports Field
- Recreation
- Government
- Cementary

There is a sharp contrast between affluent neighbourhoods and informal areas like Manshiet Nasser. Wealthier areas, such as Nasr city and Zamalek, feature housing areas with more green spaces, more accessible infrastructure and many facilities. Gated clubs and facilities like Gezira sporting club and Fustat ask entry fees and restrict access for lower income households to public spaces. This increases inequality in terms of access and favours higher income households.

In contrast Manshiet Nasser is functionally cut off from the rest of Cairo by the Northern and Southern cemetery as well as al-Nasr road. The area has access to one children's hospital, some youth centres and primary schools. Since public amenities and good infrastructure are limited, residents have to rely on public transport and face restricted access to health, educational, and recreational facilities.

Due to the construction of the New Administrative Capital these distances are increasing. The government is moving ministries and services like banks are following suit. In a country like Egypt, where much paperwork still needs to be done in person, this poses a challenge to inhabitants without easy access to transportation.

Manshiet Nasser Spatial Analysis

The spatial analysis of Manshiet Nasser (1:15,000) shows the urban development, the infrastructure and the socio-economic aspects.

Urban Development

Urban Development

Manshiet Nasser dates back to the 1960s when an informal community received implicit permission to live on government land in al-Muqattam Mount. The community consisted of farmers who had migrated from Upper Egypt and the Delta towards Cairo and had made a living of recycling steel (Séjourné, 2009; Tadamun, 2020). When the government ordered them to vacate the land, the community refused and demanded an alternative location. Since it was president Nasir who gave the implicit permission, the land became known as Munsha'at Nasir (Tadamun, 2020).

Al-Muqattam was initially uninhabitable due to the mountainous terrain and the lack of infrastructure. The first road al-Autostrad was built along al-Nasir primary road and it now known as Ezbet Bekhit. Residents collected water from mosques in the Northern Cemetery as the government has not provided water supply yet. Construction expanded towards the mount, levelling ground with dynamite, and building houses first with brick and then with reinforced concrete (Tadamun, 2020).

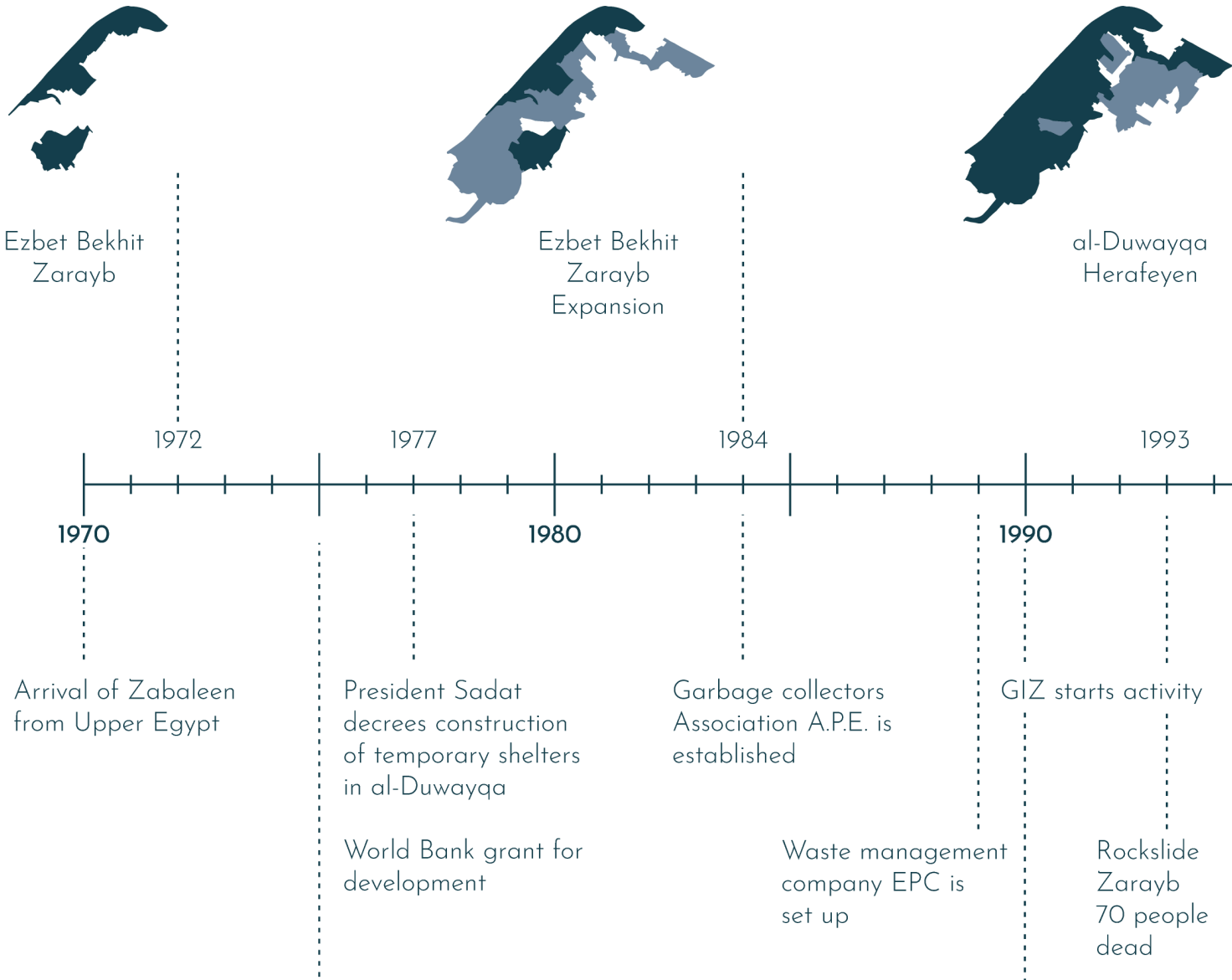
New influx came in 1970 when a group of Coptic Christians known as the garbage collectors Zabbaleen arrived (Fahmi & Sutton, 2010). Their main job was rearing animals, collecting garbage and sorting organic waste to feed their animals (Tadamun, 2020). They had been forced to relocate eight times before arriving in Manshiet Nasser due to the smell of animals and garbage (Gerlach, 2009). The fear of eviction remained until 1975 when the al-Inba Simaan Church and Monastery were constructed (Tadamun, 2020). This led to the construction of permanent homes and the neighbourhood's expansion. The church established the Garbage Collectors' Association in 1984 providing the neighbourhood with services.

In 1977, Manshiet Nasser expanded in Duwayqa following a presidential decree by Sadat (Tadamun, 2020). Families from other informal areas were permitted to build temporary housing for six months while awaiting suitable permanent housing. However, this promise was not fulfilled, and families ended up living in small units without water and sanitation systems. Over time, the area became more densely populated.

Public housing projects, including Herafeyen and Suzanne Mubarak, were introduced in Manshiet Nasser. Herafeyen featured workshops in the plinth, primarily for car workshops. The Suzanne Mubarak project, a state housing initiative, provided 9,760 housing units for 50,000 people with services and utilities (Tadamun, 2020). However, the project remained relatively small compared to the total population and is characterized by a very low-density urban plan.

In 2008, a rock slide in al-Duwayqa occurred killing 120 people, injuring 72 and making a several hundred more homeless (Tadamun, 2020). There are conflicting accounts of the governmental response to the situation. An advisor claimed that families had been offered alternative housing 35 km away, however official statements do not mention such an offer; The Housing Minister said residents were supposed to move to Suzanne Mubarak, but this was delayed; and finally the Egyptian Center for Housing Rights (ECHR) said residents were never offered this, otherwise they would have accepted.

Manshiet Nasser | Timeline



Construction of St Sama'ans Church



Desouki, 2008

General Authority for Cairo Cleaning and Beautification issues the replacement of wagons with trucks for waste removal



Suzanne Mubarak



Demolition al-Duwayqa

1998

2003

2008

2018

2000

2010

2020

- 2 major government development plans.
1. Housing project in al-Duwayqa.
 2. Multi-stage project for other areas managed by GIZ

Government signs contract with 3 European companies to sell Cairo's waste

Demolition of al-Duwayqa



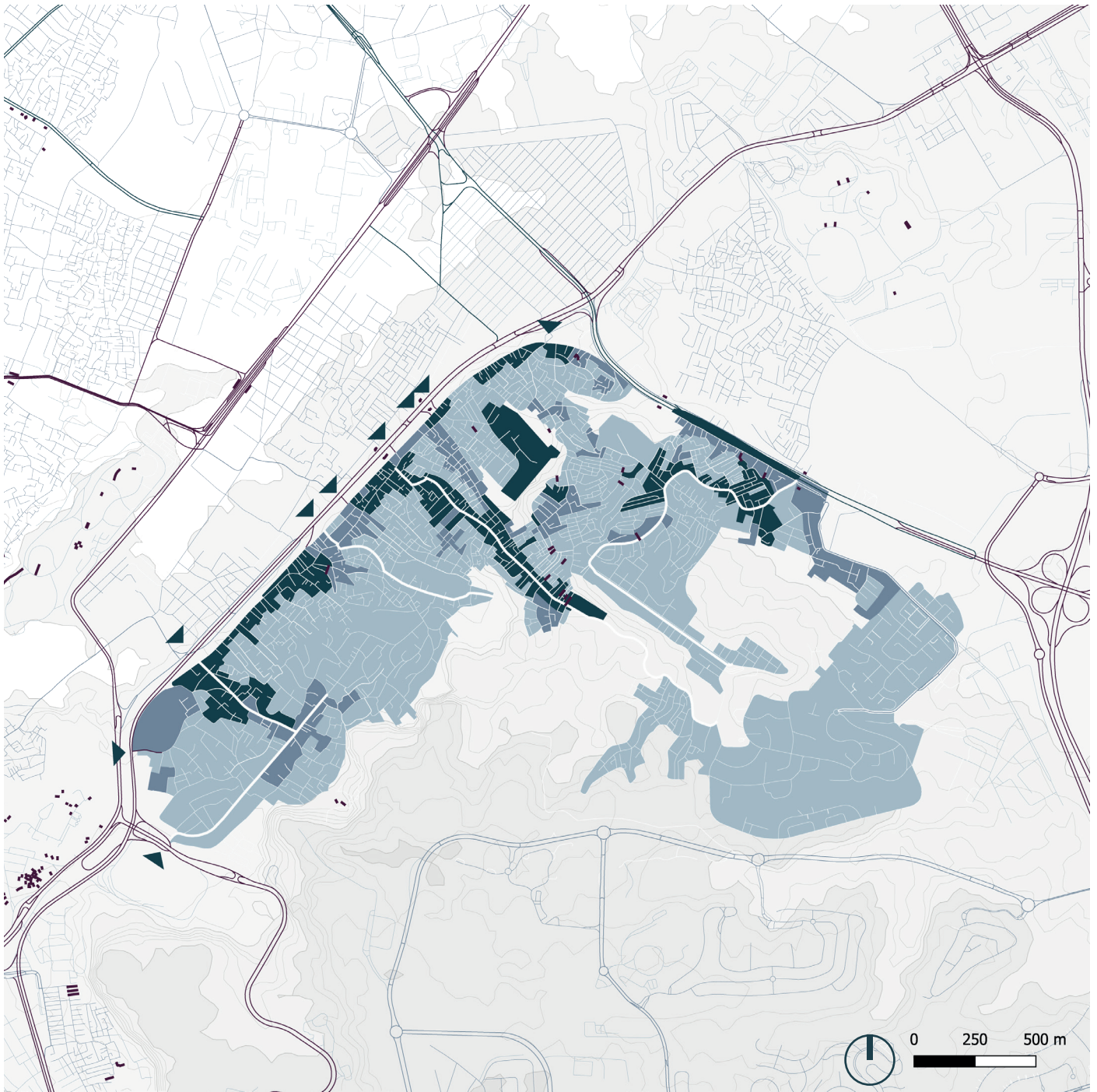
Suzanne Mubarak Housing



Figi, 2008

Rockslide al-Duwayqa
120 people dead, 72 injured,
100-150 people homeless

Manshiet Nasser | Infrastructure



Infrastructure (Map data from OpenStreetMap; Mohamed et al., 2022)

Legend

- Primary road
- Secondary road
- Tertiary road
- - - Train
- - - Metro
- Train stop
- Metro stop

Space Syntax

- Low
- Medium
- High

Topography

The topographic underlay shows the height difference from 50m to 200m. The steep edges of limestone form a risk for the inhabitants of Manshiet Nasser. In 1993 and 2008 this had already led to rock slides killing inhabitants. Nahla & Hamed (2020) explain that is caused by several factors. The mount has cracks that are worsened due to stress by earthquakes, buildings on the edges, water seeping in from rain and sewers, and close-by construction. Therefore risk-prone areas should be taken into account for urban planning.

Infrastructure

The main entry points to Manshiet Nasser are located on al-Nasr road in the Northwest. From here, inhabitants walk or take micro buses to get to their destinations. Since the area is not connected to public transport, inhabitants have created their own informal network with micro buses and tuk-tuks. These vehicles provide transport within the area and connect it to the rest of the city. The area itself consists mainly of narrow winding roads with the exception of Herafeyen and Suzanne Mubarak. This makes the informal area difficult to reach for emergency vehicles, such as ambulances, fire fighters and policemen, leading to a lack of civil protection services (Tadamun, 2020).

Due to the height differences in Manshiet Nasser, the area has to make use of stairs, which are marked in purple in the figure on the left. Three footbridges over the high way connect Manshiet Nasser with the Northern Cemetery. The slopes and steps limit the elderly and people with disabilities to go around the area (Tadamun, 2020).

Space Syntax

Mohamed et al. (2022) employed space syntax, which is a tool to analyse "spatial configurations of buildings and urban spaces" (Mohamed et al., 2022, p. 4). This tool is specifically useful to map accessible streets, which allow for activity and in turn map human patterns.

In the figure on the left, the street-network accessibility analysis (sDNA) of Mohamed et al. (2022, p. 8) has been adapted to show low, medium and high street-work accessibility Manshiet Nasser.

It shows that Al-Nasr road and a few longer streets are highly accessible, acting as main arteries from entry points and accommodating numerous businesses. The main street in Zarayb, primarily used for garbage transport, has high to medium accessibility. The public housing neighbourhoods are spatially isolated. Although Al-Nasr highway links Manshiet Nasser to the city, connectivity with neighbouring areas is poor due to surrounding cemeteries and the topography of the desert. Overall, the settlement is poorly integrated into the city's global structure.

Manshiet Nasser | Socio-Economic



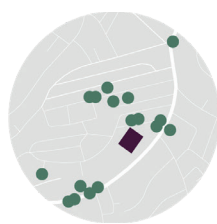
Facilities & distinctive neighbourhood patterns (Map data from OpenStreetMap & Google)



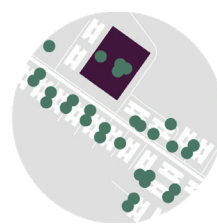
Zarayb



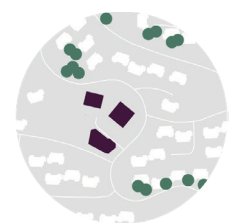
Ezbet Bekhit



Duwayqa



Herafeyn



Suzanne Mubarak

The district of Manshiet Nasser officially includes the settlement south of al-Nasr road as well as the Northern cemetery and is divided into eight parts. However, as Tadamun (Tadamun, 2020) states: "Administrative boundaries often have little meaning in reality". The inhabitants consist of different groups that each have their own origin. Consequently these groups have a different hometown, histories, relations and traditions. During a workshop organised by the Tadamun Initiative "residents of any given area could not draw a map of other areas within Manshiet Nasser". Consequently, in this section I focus on the areas in Manshiet Nasser that have recognisable spatial characteristics, as well as a documented history.

Manshiet Nasser is unique in terms of trade and small industries, often the reason that groups were moved to the area. Most inhabitants work in the informal sector: 65% in crafts and administration; 14% in garbage related activities; and 21% in private vocations (Tadamun, 2020). This is reflected in the presence of kiosks and stores for daily necessities, as well as workshops in the plinth of buildings. These functions are present throughout the whole area, with the highest concentration around the main streets.

Due to the high density in most parts of the settlement, green spaces are lacking. Most larger compounds such as an NGO, youth centre or school have sports fields and trees, however these places are still privately owned and not one public park is present. The public housing neighbourhoods of Herafeyen and Suzanne Mubarak generally have more trees, but the combination of wide streets and little shade still makes these spaces unattractive.

Mohamed et al. (2022, p. 10) conclude from their analyses that "taller buildings tend to appear in the most accessible parts of the settlement, and high degrees of land use diversity are generally related to areas with high building densities".

Zarayb in the south is home to the Zabbaleen community. It has a very high function mix of housing and amenities, as well as housing and work (Mohamed et al., 2022). The largest areas are the religious compound of the cave church, the compound of the NGO Association for the Protection of the Environment and the water utility company owned by the government. Especially the A.P.E. area combines work, sports fields, primary schools and a green space. The surrounding area combines housing, amenities and work as well.

Ezbet Bekhit in the most Northern part consists of medium rise blocks mixed with low rise blocks, all densely packed together. In these block housing is combined with amenities, while some blocks are only residential (Mohamed et al.,

Legend

-  Hospital
-  School/ Religious
-  Park
-  Sports Field
-  Recreation
-  Government
-  Cemetery

2022). The inhabitants in this area work in crafts and produce products such as carpets and shoes. The area is home to the only hospital in Manshiet Nasser, focussing on children. Close by is the Culture Palace, which is a youth centre, where they have sports fields and provide extracurricular activities.

The main part of Duwayqa is housing, with some buildings combining housing and amenities. It is densely built with low rise blocks (Mohamed et al., 2022). A large part of the area has been cleared in 2017 due to the rock slide of 2008. Herafeyen is the busiest working area in Manshiet Nasser, besides Zarayb. The area was designed in the 1980s with space for workshops in the plinth (Tadamun, 2020). Nowadays, this craft is still present and many car maintenance and mechanics service a wide range of Cairenes. The medium rise block are grouped alongside the main road (Mohamed et al., 2022).

Suzanne Mubarak is the most recent public housing area, built from 1999 (Tadamun, 2020). It consist of medium rise blocks group in between wide winding streets. A large part of Suzanne Mubarak has only a residential function, with some blocks combining housing and amenities. Additionally, there are some primary schools as well as mosques and one church. However, many amenities in Suzanne Mubarak exist due to illegal kiosks and plinth expansions built by residents (Mohamed et al., 2022). This leads to fear of residents of government intervention, which is strengthened by the proximity of a police station and a military training facility.



Skyline of Manshiet Nasser (Cassel, 2015)



Summer programme in upgraded school in Ezbet Bekhit (Aga Khan Trust for Culture, 2007)



Suzanne Mubarak housing with microbuses and kiosks

Zarayb Fieldwork

This chapter shows the synthesis and the findings of the fieldwork in the area of Zarayb. First it shows the day to day life of a Zabbaleen family, then it shows the relation of social and working space in an urban section and finally it gives an overview of the functioning of the waste management system.

The Fieldwork for this thesis was done in September 2024. It consisted of a two day visit to the site with a local guide and several exchanges with inhabitants. A previous visit in another context allowed me to understand Manshiet Nasser as a whole, but also the difference between different neighbourhoods within the district. The visit in 2024 was specifically focussed on the Zarayb neighbourhood and its inhabitants.

Route

The route during the site visit is depicted below. The goal was to see a variety of streets, facilities and spaces. I observed and compared the different types of streets, such as the main street, working street, streets with facilities and the old tram way through and Environment Quality Survey which can be found within the appendix. The photos of the site visit with date and time stamp are collected in a separate booklet.

Soft Map

My personal experiences and findings of the site visit are visualised in an A2 soft map. A small version of this can be see on the next page. Here is becomes apparent that there is a separation in the area due to the roads. East of the road the district is more orientated towards recycling, while west of the road the settlement is more developed and residential.



Route of the site visit (Satellite image from ESRI Imagery)

AL AZHAR PARK

ENTRY REQUIRED
END

THIS WAY TO COLLECT TRASH

DEAD PEOPLE
TOMBS
QAYTBAY
LIVING PEOPLE
HOUSES
MOSQUES

RUN TO CROSS THE STREETS!
PRAY EVERY TIME

THIS WAY FOR HIGH SCHOOL

TRY YOUR LUCK TO REACH SALADIN'S CITADEL OR AL-AZHAR PARK WITH THIS TINY BADLY CONNECTED SIDEWALK

WATER UTILITY COMPANY
OF THE GOVERNMENT

E&E
PAY BEFORE USAGE
NO PHOTOS!

KEEP OUT!

MOSQUE
MY GUIDE'S FAMILY GOES HERE

ARABIC GEOGRAPHY
RELIGION
MATHS

SCHOOL
5000 BUSY SCHOOL CH
NICE TREES
MAN WATERING THE PLANTS

SCHOOLS
DIFFERENT HOURS FOR AGE GROUPS

NGO
SCHOOL ON THE ROOF WITH 4 CLASS ROOMS FOR BOYS & GIRLS

BEEP!
BEEP!
GATE

PIGGEON TOWER
BACHELOR PAD
CARS DRIVING IN & OUT

DANGEROUS WORK
HELTING PIC BUZZ SAWS
TRASH = EVERYWHERE

CITADEL OF SALADIN

MUSEUMS
MOSQUE
TOURISTS

FOOT BRIDGE
HOME IT APE TRY NOT TO DIE!

SHOPPING MALL

CONFUSED WHICH WAY TO DRIVE...?

THIS WAY FOR MORE HAZARDOUS WORK

TOXIC FUMES
SO MANY CARS
OLD TRANT TRACKS
SHOPPING STREET · AHWA · TREES · TRANS

MAIN STREET

CAR CAR CAR VAN CAR PICK-UP CAR CAR MICROBUS

HISTORIC

COFFEE WATERPIPE TEA

THE QUALITY OF DEBATA BE

THE VIEW!
PROMENAD

PIGS

COUPLES GO AT NIGHT FOR FRESH AIR
COFFEE TEA (MOSTLY MEN)

PORT

NGO A.P.E.

RECYCLING PRODUCTS: BAGS · CARDS TEXTILE · SOCKS

FOR THE SMALLEST ONES

SYNTHETIC TURF ON THE ROOF?

PRIMARY SCHOOL
SCHOOL

GREEN OASIS

GREENHOUSES

WALLED OFF

CAR PARK 10000

HELLO CLIFF EDGE

POOL TABLE
X BOX
CHICKENS
SNACKS
FRUITS
GROCERIES
CLOTHES

THE ROAD TO CHURCH

SQUARE

CHURCH

ORPHENAGE
NUNNERY
WITH CHILDREN

PIGEON TOWERS!

FAMILY-WORK

SOLO-WORK

CO-WORK

small CAVE CHURCH

SECURITY CHECK...

BREEZY TREES

MUDDY WATER OR SEWAGE?
MUD · TRASH · MUD

SEATING AREA

TRASH + SORTING + TRASH + SORTING
TALL
SMELLY
SMELLY

NEW DEVELOPMENTS

SOME SPORTSFIELDS

TOURISTS!

THE CAVE CHURCH

RADIO
MIX FM 87.8



UNDER CONSTRUCTION

AL MOGATAM

ONE OF THE MOST EXPENSIVE NEIGHBOURHOODS YOU WILL FIND IS HERE TOO

Men

Trash is collected by the men during the night. Each night they drive their trucks out to wealthier areas of Cairo, where they collect trash from local households. Each family has its own designated collection territory, and trespassing by other Zabbaleen is taken very seriously; such violations can lead to serious family disputes that sometimes escalate to violence. By the end of the night, the collected trash is brought back to Zarayb, where it is stored either in garage boxes or on rooftops of family homes. In the morning, the family gathers for breakfast, after which the men rest before meeting up at the local ahwa, a café primarily for men, where they drink coffee, smoke pipes, and play tawula. In the evening, the family shares dinner together, after which the men prepare to head out once more for another night of collection.

Women

The women in Zabbaleen families take on the responsibilities of managing the household, caring for the children, and sorting collected trash throughout the day. From 8 a.m. to 5 p.m., they sort waste into various materials and categories, often without gloves or masks, and in close proximity to their homes. This work is hazardous, as they risk injuries from syringes and constant exposure to polluted air. In addition to sorting, women are responsible for selling the separated materials to local processors, making them the primary managers of household income and expenses. With limited access to childcare, they must watch over their young children, especially infants and toddlers, as they work—further exposing both themselves and their children to these health hazards.

Children

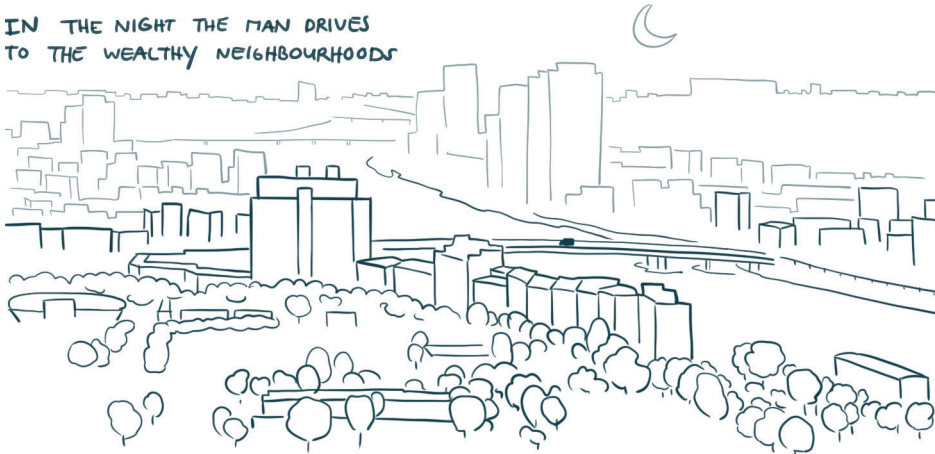
Children in Zarayb, both boys and girls, attend primary and middle schools in the area, which serve students from ages 4 to 15 and cover basic subjects such as Math, Religion, Geography, and Arabic. Teachers come from within Manshiet Nasser or travel from outside the community. However, the number of schools is limited compared to the large student population. As a result, students of different age groups are assigned separate timeslots within shared school buildings. One local public school, for instance, hosted around 1,700 students, which raises concerns about the quality of education. Families who can afford it often send their children to schools outside the area, but this option remains out of reach for many. For higher education, students must travel about 50 minutes by bus to areas like Ezbet El Nakhl. Despite these challenges, parents highly value education and hope for a brighter future for their children, supporting them in their pursuit of higher studies when possible. One young NGO employee, age 19, recently completed high school and is now studying accountancy and finance in al-Moqattam, aiming for a career in banking while balancing two part-time jobs in textile sorting and NGO work. Local NGOs also play a significant role in supporting the children, providing educational programs and sports activities such as ballet and yoga. They even organise a yearly trip for around 70 children from families that can afford it to swim at the beach.

“I don’t want my son to end up like me. I want him to have a better life than I do.”

– Gerges Saad
(RT TV-NOVOSTI,
2016)

A day in the life of a zabbaleen father...

IN THE NIGHT THE MAN DRIVES TO THE WEALTHY NEIGHBOURHOODS



THERE HE COLLECTS THE WASTE WHILE HE MINDS HIS TERRITORY



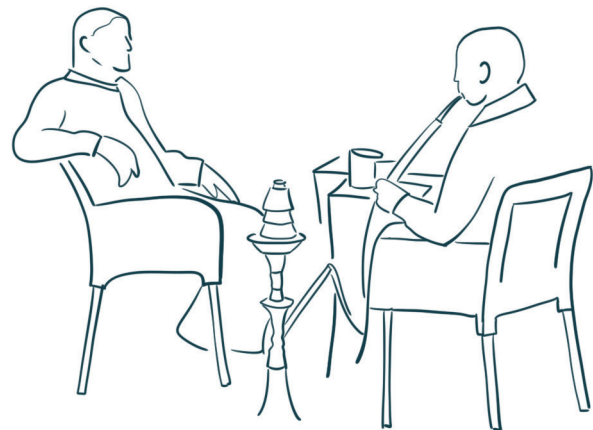
IN THE MORNING A CACAPHONY WELCOMES HIM BACK TO ZABALEEN



THE TRASH IS COLLECTED IN THE FAMILY HOMES ON ROOFS OR IN THE GARAGE



IN THE AFTERNOON HE RELAXES AT THE AHWA



mother...

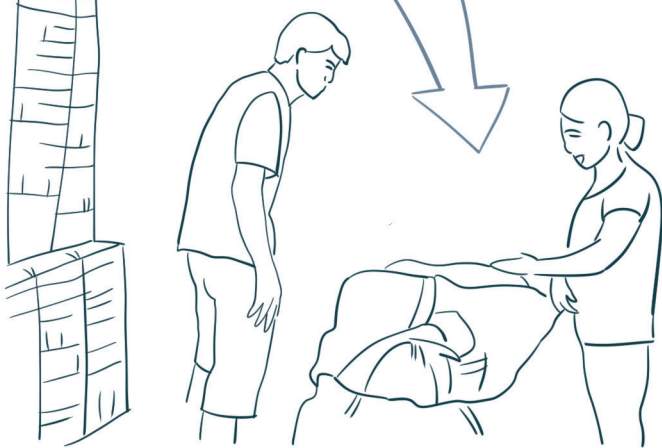
THE WOMEN SORT THE TRASH IN THE HOUSE, WHILST MINDING THE YOUNG CHILDREN FROM 8AM TO 5PM



ORGANIC WASTE GETS EATEN BY THE PIGS, IF THEY HAVE ANIMALS



SHE TRADES THE SORTED WASTE WITH SPECIALIST RECYCLERS



SHE DOES GROCERIES AT THE LOCAL SOUK OR KIOSK



AT HOME SHE CLEANS AND PREPARES DINNER



THE FAMILY ENJOYS DINNER TOGETHER IN THEIR HOUSE



and children



THE DAUGHTER GOES TO THE LOCAL SCHOOL IN THE MORNING OR THE AFTERNOON

THERE SHE LEARNS MATHS, ARABIC, RELIGION AND GEOGRAPHY



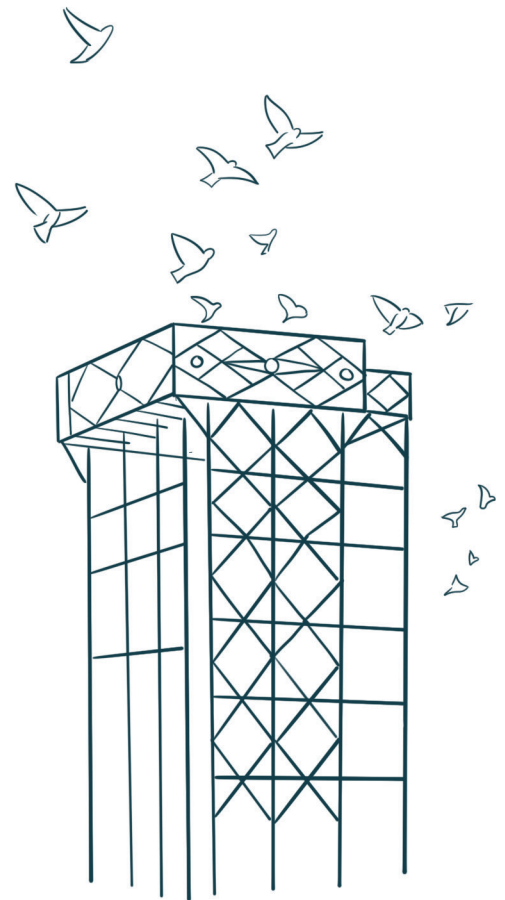
AFTER SCHOOL SHE PLAYS IN THE STREETS WITH HER FRIENDS. SOME OF THEM GO TO BETTER SCHOOLS FURTHER AWAY



SHE DREAMS OF GOING TO UNIVERSITY, WORKING AT A BANK AND BECOMING VERY RICH!

BUT...

LOOK!



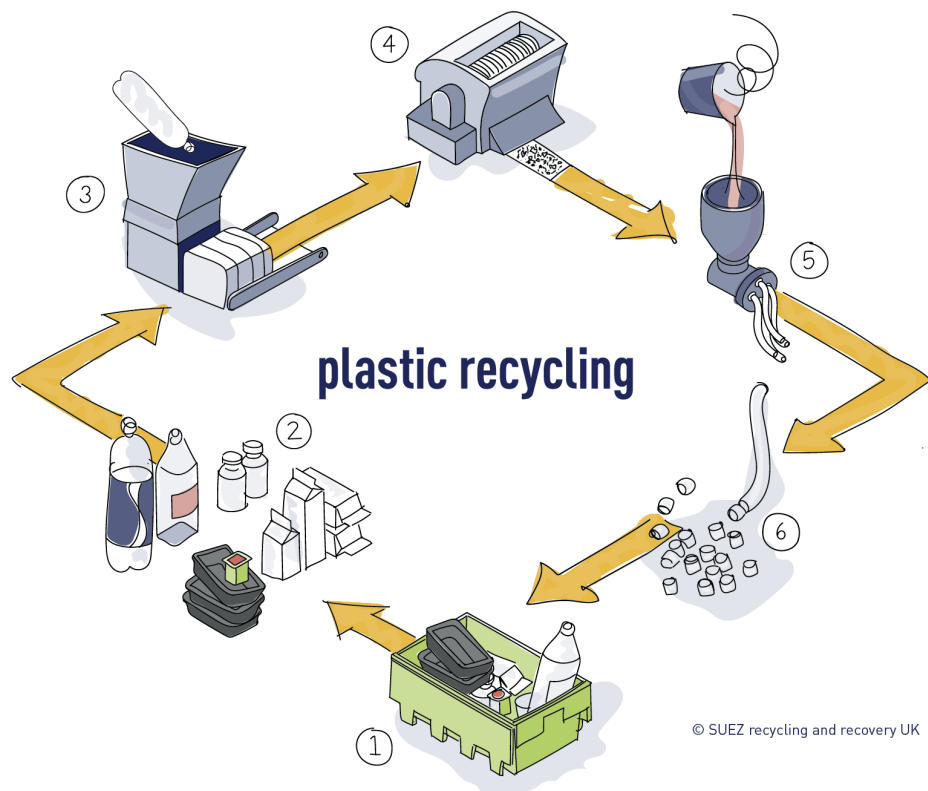
HER DAD HAS CLIMBED UP THE PIGEON TOWER AND RELEASED THE FAMILY BIRDS

Waste Management system

Waste collection and processing

The Zabbaleen community in Cairo has established one of the world's most efficient solid waste recycling systems, using locally manufactured machines to process vast amounts of collected material (Tadamun, 2020). They recycle nearly everything to maximise their income, which they earn mostly from selling sorted waste and processed waste, but sometimes from upcycled products as well. Despite providing essential waste collection services, they receive no financial support from the government. The Zabbaleen recycle diverse materials, including organic waste, paper, metals such as aluminium, plastic, fabric, and even electronic devices (see next page). They manage to process about 80% (Fahmi & Sutton, 2010) of the waste they collect, with the rest ending up in the Sahara desert for disposal. Recycled materials are sold to foreign buyers, often in China, or to local companies in Cairo, as well as other Egyptian cities such as Port Said, Alexandria, and Dahab.

In the Zabbaleen recycling process, plastic is first sorted by colour, then shredded into small flakes, cleaned, and melted into pellets, which can be further moulded into new products such as chairs. However, the melting of PVC releases toxic fumes. Paper undergoes a sorting process based on type, such as carton or regular paper, and is then pressed and remade into items like carton boxes, gift cards, or other paper products. Glass presents unique challenges for recycling since not all glass is reusable and high temperatures are needed



Recycling process of plastic (SUEZ, 2024)

to (re)melt it; it is sorted by colour and composition before being sold to specialized recycling companies. Locally, broken glass pieces are repurposed by the Association for the Protection of the Environment (A.P.E.) into products like Christmas ornaments. Aluminium is sorted, crushed into cubes, and melted into ingots—a process that ties back to Manshiet Nasser’s history, where in the 1970s, aluminium workshops were established after the Egyptian government encouraged the industry to move to this area (Tadamun, 2020). Textile waste is sorted by size, with large and small fabric pieces sold to the A.P.E., which uses looms and sewing machines to create products like bed sheets, decorations, and bags. Electronic devices are carefully dismantled to separate the plastic and extract valuable metals such as copper, gold, and lithium. Organic waste, meanwhile, is fed to pigs and composted, with the compost later sold to farmers in regions like Sinai (Fahmi & Sutton, 2010). Notably, Zarayb is one of five other areas in Cairo that participates in waste collection and recycling.

Actors

The Zabbaleen primarily work within family groups, though they sometimes form small companies to increase their profits. For instance, friends or brothers may collaborate and specialize in certain products, though these partnerships vary in structure. Some families work separately in their own homes, while others set up collective compounds to work together.

Wahiya

The Zabbaleen do not have direct contact with the Cairene households from which they collect waste. Instead, middlemen known as the Wahiya retain control over garbage collection rights. In 1989, the Environmental Protection Company (EPC) was established, allowing the Wahiya to contract groups of Zabbaleen for waste collection and disposal (Fahmi & Sutton, 2010). According to Fahmi and Sutton, “The Wahiya administer the system, market the company’s services, collect household charges, and supervise service deliveries” (2010, p. 1768). Through the EPC, the Wahiya and Zabbaleen became central stakeholders in Cairo’s waste collection system (Fahmi & Sutton, 2010). However, as reported informally during my fieldwork, this system has downsides, including occasional extortion, such as when the EPC seizes valuable items discovered by the Zabbaleen.

Government

Despite the Zabbaleen’s successful recycling industry, government policies began to threaten their business (Tadamun, 2020). In the 1990s, the government mechanized waste collection, requiring Zabbaleen to switch from donkey carts to trucks. Without government financial support, Zabbaleen had to obtain funds for trucks through savings, asset sales, or loans (Fahmi & Sutton, 2010). Additionally, the government contracted private companies to handle residential waste collection, undermining the Zabbaleen’s services and leaving them uncertain about payment for their work. In 2003, three European companies were contracted to manage Cairo’s waste, with the government claiming that traditional methods were unsanitary (Tadamun, 2020, Section 6). Instead of collaborating with the Zabbaleen and Wahiya, the government restricted

their operations, depriving them of income. However, the European companies proved ineffective: their trucks were too large for Cairo's narrow streets, and their contract only required them to collect 20% of Cairo's waste, with no verification of recycling. When the contract was ultimately nullified, the government failed to inform citizens about the consequences for waste collection process (Tadamun, 2020).

Health

The Zabbaleen's work has made their community one of the wealthiest in Manshiet Nasser, though this wealth comes at the cost of their health and the industrial character of the neighbourhood (RT TV-NOVOSTI, 2016; VRT 1, 2022). Some Zabbaleen who can afford it move to neighbourhoods like Maadi but continue working in Manshiet Nasser daily. The work environment is hazardous, with frequent accidents such as fingers lost to cutting machines, crushed feet from compression machines, and house fires that spread easily from one home to another. Due to the narrow alleyways, fire-fighters often struggle to reach the area, so residents typically attempt to extinguish fires themselves (Tadamun, 2020). The community has access to basic health clinics and a children's hospital in nearby Ezbet Bekhit for minor issues, with specialized doctors occasionally volunteering in the area. The relatively high income among the Zabbaleen enables them to afford healthcare when needed. In an effort to reduce health risks, some Zabbaleen have moved some of the more toxic work, particularly heavy industrial processing, out of Manshiet Nasser to places like El Katameya, south of New Cairo. This has led to a noticeable decrease in respiratory issues according to inhabitants, especially among children, since the relocation of these activities.



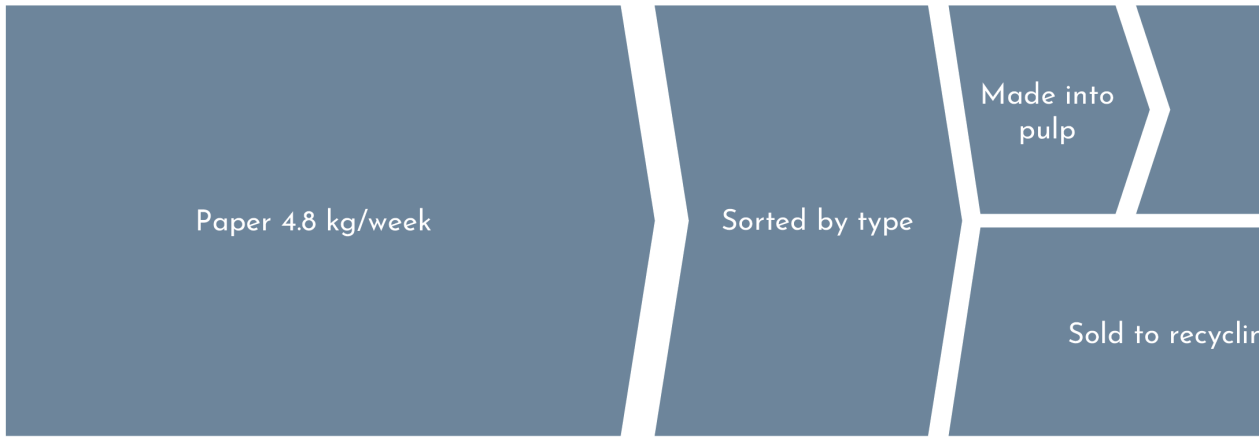
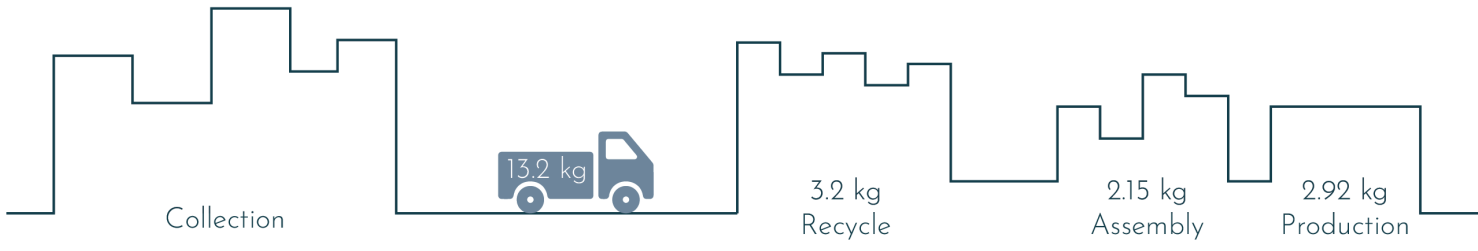
Man loading paper (Migné, 2022)

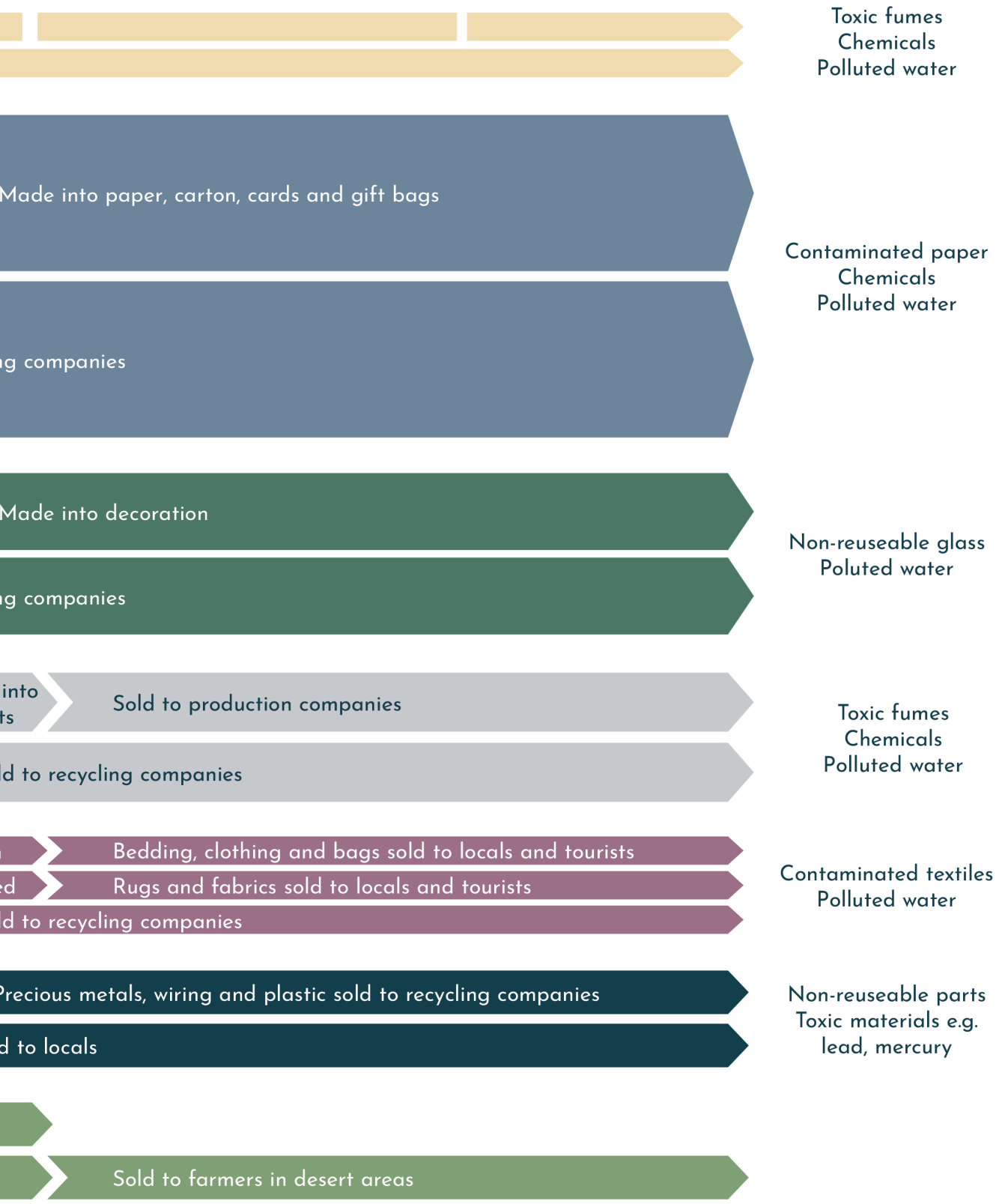


Child sitting in trash (Dench, 2019)

Cairo

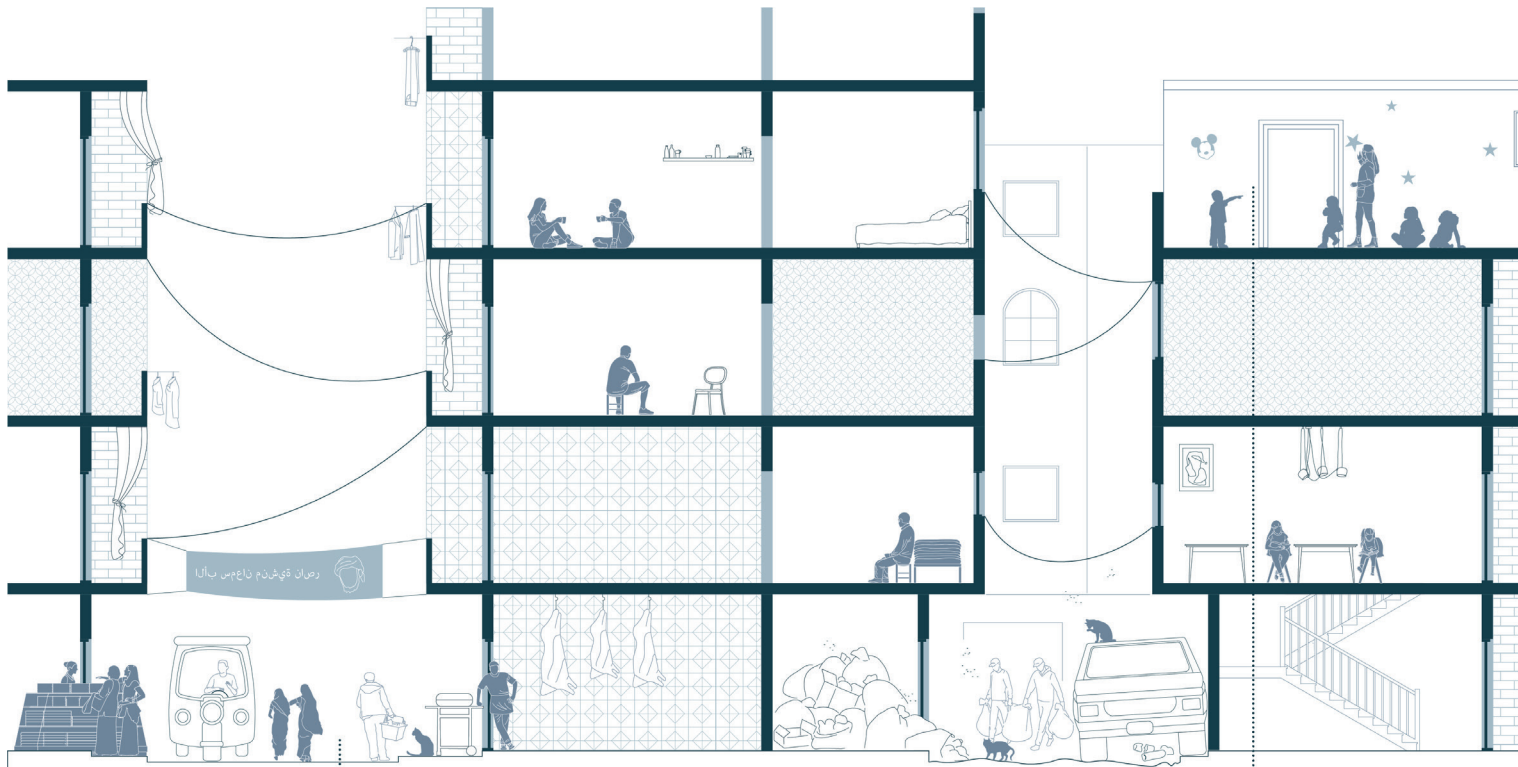
Zarayb



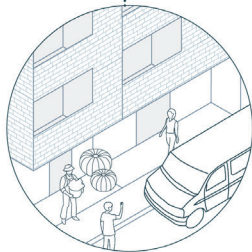


Waste Management System (Data based on informal interviews; observations)

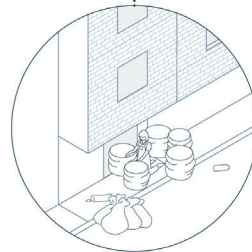
Urban section



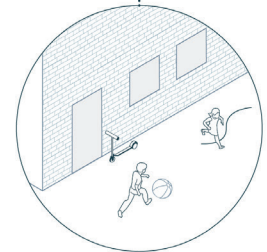
0 1m 2m



Shopping Street ●

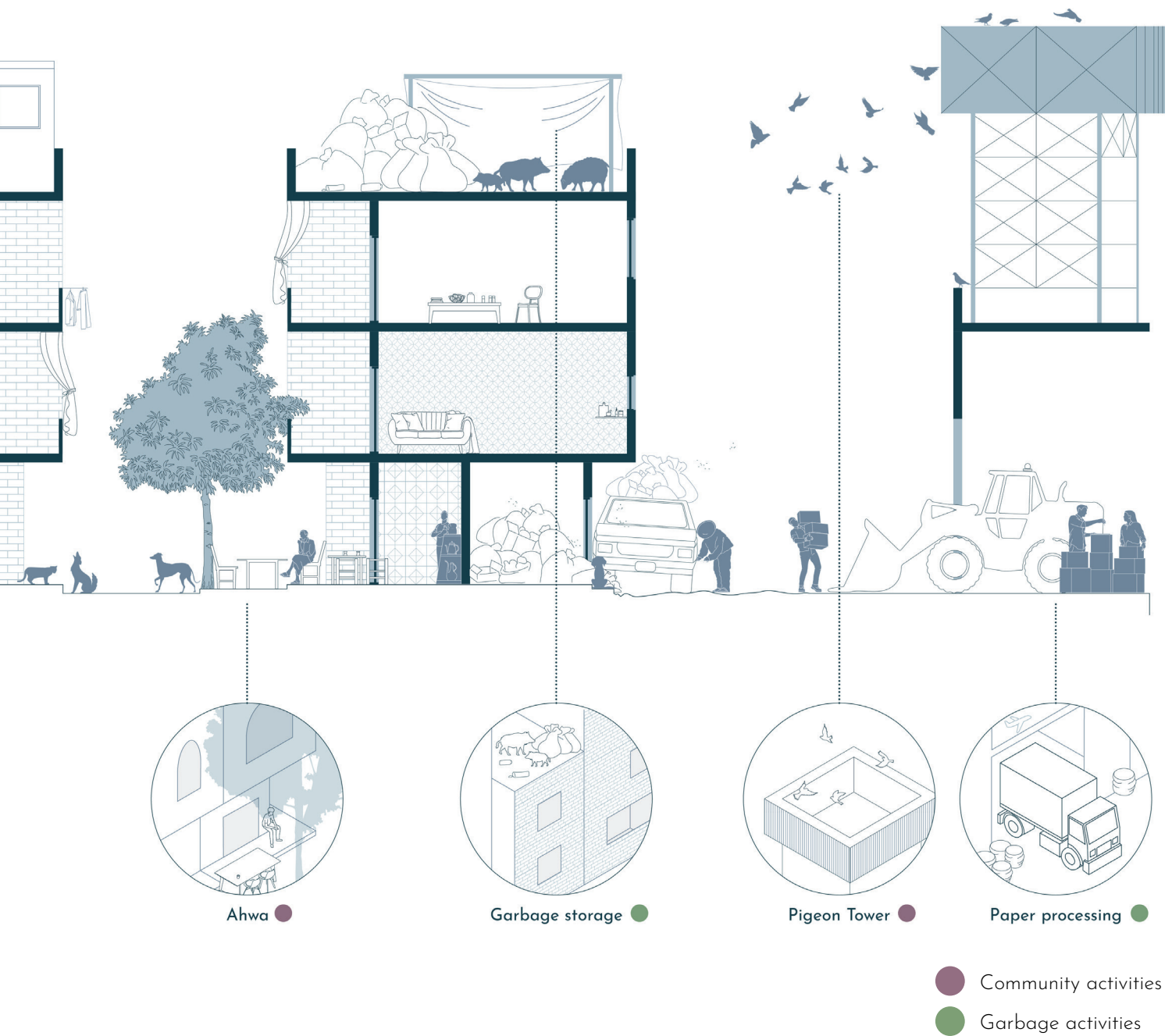


Garbage sorting ●



Primary School ●

In Zarayb, homes are typically owned by a single family, with each level of the building built for a different generation. New levels are often constructed for sons to live with their future wives, while daughters move out to join their husband's family home. Work is conducted in garages on the ground floor or on rooftops. Inhabitants are responsible for covering the costs of government-provided electricity and tap water, which have become more expensive in recent years. Trees along the streets are privately owned and cared for by

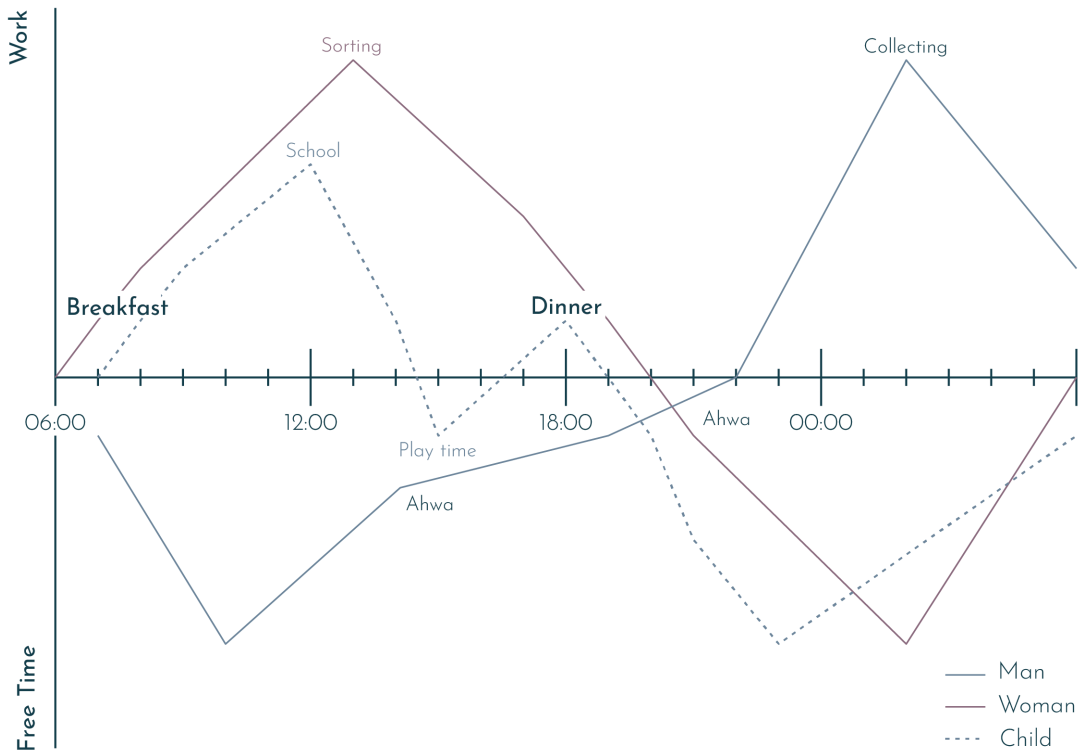


Principal urban section

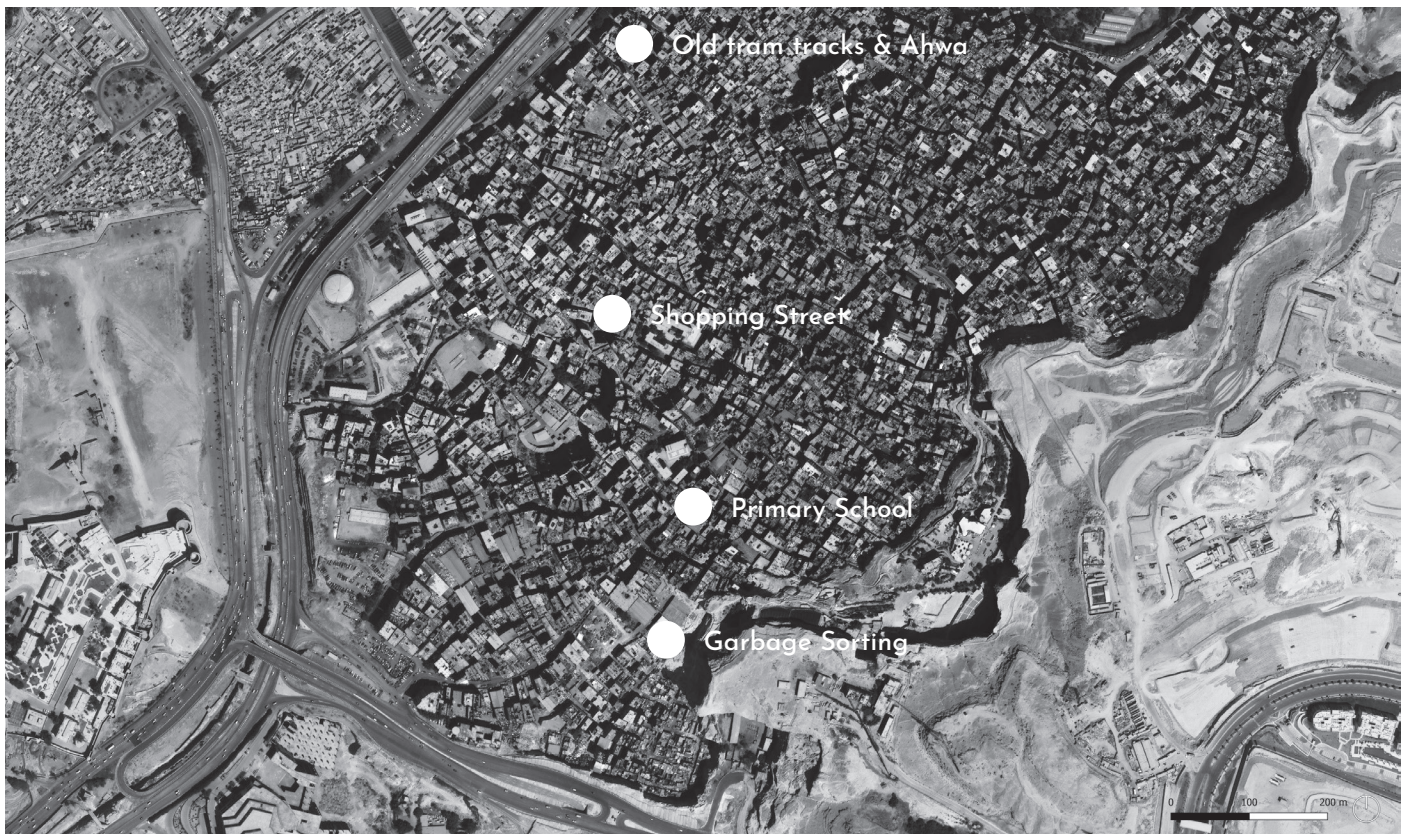
local residents, schools, or NGOs. Households often plant and water trees in front of their homes, though they take care to keep the streets wide enough for cars to pass through.

The area's streets vary character and appearance, though they appear next to each other and alternate through the whole area. Main streets are lively, lined with a wide range of shops selling everything from meat and clothing to

electronics, with amenities like an Xbox gaming area, a pool table café, and multiple ahwas (coffeehouses). These streets are typically paved, equipped with sewage systems, and relatively clean. Streets housing schools, charities, or NGOs are often greener, as these organizations have the means to plant and maintain trees. In contrast, working streets—often found in back alleys, dead-end streets, and especially in the southeast—are more congested and polluted. While some of these streets are paved and have sewage systems, they can still be muddy due to frequent sewer overflow. Trash and animals are common, and air quality is poor from the smells of waste and the processing of materials like PVC and aluminum. Certain sections of these streets focus on larger-scale waste processing, sometimes operating out of homes or dedicated warehouses.



Daily Rhythm of a Zabbaleen family



Locations of the streets used in the Environmental Quality Survey

Stakeholder Analysis

The stakeholder analysis shows the actors involved in Manshiet Nasser and the waste management system. The stakeholders are divided over the three sectors of public, private and civic, active from the local to the international scale. In an onion diagram their mutual relations are shown and a power-interest matrix shows their stance on intervening in Manshiet Nasser.

Stakeholders

The stakeholders involved in Manshiet Nasser and the waste management system of Zarayb are divided over the three sectors of public, private and civic. In the public sector the biggest stakeholder involved is the national government of Egypt. Their governance has a history of maladministration and operates very central. In the private sector the Zabbaleen and all related commercial partners are active. The distinction between the Zabbaleen as entrepreneurs and as citizens is difficult to make, since their work also defines how they behave as civilians. The civic sector has a long history of involvement of NGOs and local organisations, concerned with the general well-being and environmental quality of Zarayb.

Public sector

In the public sector the stakeholders all related to the national government of Egypt. It is a complicated web of actors, ranging in power, serving the vision of the cabinet and most of all, the president. The governance of Egypt is marked by maladministration, counterproductive policies and a centralised government (Abdelaal et al., 2021; Kenawy, 2016). Historically this led to the formation and growth of informal settlements (Kenawy, 2016), and currently this is contributing to the retention of the current conditions in informal settlements.

History of state policies for informal settlements

Until the 1970s the Egyptian government contributed to the formation of informal settlements due to a series of rental control laws (Kenawy, 2016). The housing stock declined and deteriorated, while private companies operated in the high income sector. In 1977 New Town policies were launched to relocate migrants to the desert fringes (Séjourné, 2009). The government viewed these public housing initiatives and cooperatives as a solution to migration and overcrowding, but they were unaffordable, inadequate and located too far from job opportunities (Kenawy, 2016; Séjourné, 2009). At the same time, the government responded to other types of development with strict measures such as military decrees (Séjourné, 2009).

In the 1990s the earthquake in Zarayb led to accusations of negligence and indifference of the Egyptian government towards informal settlements. International pressure increased and partnered with civil society, a strategy of development and upgrading was started (Elgohary et al., 2024; Kenawy, 2016). The National Programme for Urban Upgrading was launched by the Mubarak government, which focussed solely on physical upgrading. This was often seen as "raising control over areas difficult to control, but also to rehabilitate people that were thought to be uncivilized" (Kenawy, 2016, p. 22). The organisation of the programme was mostly top-down and lacked a participatory approach. Therefore "basic information on the needs of informal areas were lacking, many people were not aware of the programme and did not feel any improvements" (Kenawy, 2016, p. 22). The program was relatively successful in providing sanitation and access to clean water in some areas, however many unsafe areas were also evicted and moved to housing in new areas.

After the Duwayqa rockslide in 2008 the Informal Settlements Development Fund (ISDF) was created, tasked with mapping informal settlements and their status (Omar, 2018). The term 'Ashwaiat' was replaced with the categories

'unsafe' and 'unplanned' (Elgohary et al., 2024). The government continued to operate under this banner, clearing away 'unsafe' areas in Duwayqa in 2015. Residents were supposed to be located to new housing units constructed in Suzanne Mubarak, now named 'al-Asmarat', with a 200 million EGP fund established in 2014 (Elgohary et al., 2024; Tadamun, 2020). As of 2021, the ISDF has, also been rebranded as the Urban Development Fund (UDF). The CEO of the UDF comments on this change on Egypt Today (2024, par. 4): "After successfully addressing slum conditions, we rebranded the fund to focus on housing projects aimed at constructing 500,000 units."

Centralised government

The history of state policies is mostly tied to centralisation, which dictates executive and financial authority (Abdelaal et al., 2021). In the first place the G.C.R. is under the jurisdiction of three governorates, Cairo, Giza and Qalyobiya, as well as the central government authorities (Kenawy, 2016). Consequently decisions on development and public investments are taken on both the local and the central government level. Secondly the governors have full executive authority, whilst the financial authority remains with the Egyptian ministries (Abdelaal et al., 2021). "locally elected officials being reluctant to risk the political disfavour of imposing such taxes, thus 'reinforcing the centralised nature of governance'" (Abdelaal et al., 2021, p. 46). To realise development projects, finances are either approved by the central government authorities or allotted by executive board or companies. Often these are financed by leading politicians and enforce top-down visions instead of responding to local needs.

In short, the government has never seen the informal waste management system as a chance for development, nor have they attempted to recognise their work and improve their conditions. Instead, the government focuses on the perceived issues within informal settlements, often opting for relocation, seemingly assuming that disregarding these communities will make them disappear. Ultimately, this leaves residents to generate income without providing an alternative and to solve their problems on their own without support (Tadamun, 2020).

Governance Level

National

Regional

Local



Type of planning

Policies

Plans and programs

Policy Implementations

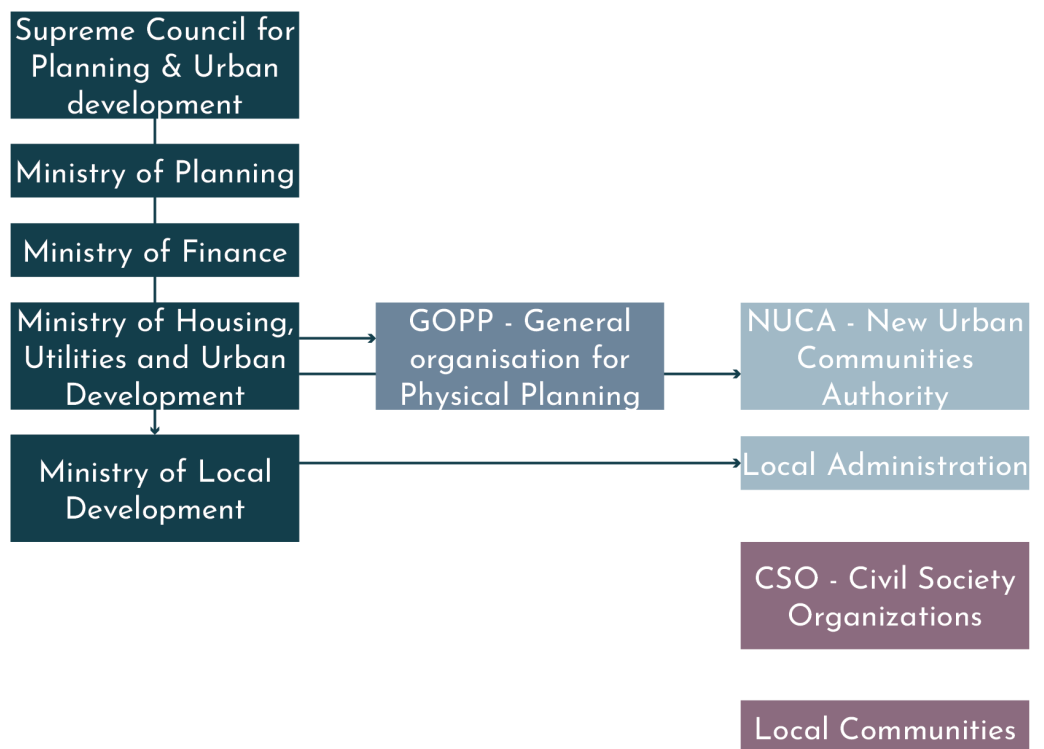
Plans

National Development Plan

Regional Plans
Cities Plans
Urban Plans

Projects

Actors



Organisation of the governmental body (based on Omar, 2018)

Overview

Objective

	Overview	Objective
Public	Pu.1 Supreme Council for Planning and Urban Development SCPUD	Determining national objectives and approving urban development plans
	Pu.2 Ministry of Housing, Utilities and Urban Development MHUUD	Preparing urban development for existing and new towns within the national policy framework
	Pu.3 Ministry of Planning and Economic Development	Long term planning and budget allocations according to national policy framework
	Pu.4 Ministry of Local Development	Governing urban development and supporting decentralised initiatives
	Pu.5 Urban Development Fund UDF (Prime Minister's Office)	Improving informal settlements, developing new urban areas and enhancing existing neighborhoods
	Pu.6 General organisation for Physical Planning GOPP	Preparing plans and programs on national and regional level. Approving plans on local level.
	Pu.7 New Urban Communities Authority NUCA	Preparing structure-, master- and detailed plans for new communities.
	Pu.8 Local Administration/ Governorate	Executing urban development through detailed plans with support of GOPP
Private	Pr.1 Researchers	Generating knowledge and mapping problems and opportunities
	Pr.2 Environmental Protection Company EPC	Collecting and processing company based on business agreements between Zabbaleen and Wahiya
	Pr.3 Zabbaleen	Collecting and processing waste to generate income
	Pr.4 Wahiya	Managing contact with households and controlling access and collection rights of Zabbaleen
	Pr.5 Recycling companies	Buying up separated or processed waste from Zabbaleen
	Pr.6 Manufacturing companies	Buying up recycled raw materials to produce new products from Zabbaleen or recycling companies
Civic	C.1 Association for the Protection of the Environment A.P.E.	NGO improving well-being of the Zabbaleen and promoting sustainable environmental practices
	C.2 Civil Society Organisations UN-Habitat, GIZ, World Bank	NGOs Responding to on the ground needs with limited decision making power
	C.3 Local Organisations	Promoting community participation with limited formal involvement
	C.4 Cairenes	Guaranteed collection of waste, but 'Not in My Back Yard'

Problem perception

Power

Resources

Informality is a threat to the state, slums needs to be removed and unplanned areas improved



Control, funds, approval

Developing plans for desert expansion and improving unplanned areas will provide housing.



Control, funds, expertise, approval

Investments in desert expansion will provide better housing and economic growth.



Funds, approval

Intervening in unplanned areas in existing urban areas will improve living conditions



Expertise, funds

Constructing 500,000 units will provide affordable housing, community and sustainable development



Funds, control

Zarayb is a slum and in need of urban upgrading, but Zabbaleen are crucial for waste management.



Expertise, approval

Constructing new communities in the desert will provide better housing



Expertise, approval

Governorates lack authority, staff competence, or finances to execute (local) projects



Experience, network

Zabbaleen are a unique community, but face socio-economic and environmental challenges



Expertise, network

Waste collection is a business with higher financial gain if Zabbaleen and Wahiya collaborate.



Contracts, network

Waste collection secures livelihood, but endangers health and does not provide future opportunities.



Community network, strikes

Waste collection secures livelihood.



Household contacts

Cheap labour provides processed waste for low prices.



Money

Cheap labour provides low prices, but specialised labour provides higher quality materials.



Money

Zabbaleen lack services, education, health care facilities and bottom-up support



Grassroot support, education

Zabbaleen lack services, education, health care facilities and bottom-up support



Funds, tools, soft and technical assistance

Top down plans do not respond to the needs of inhabitants, bottom up initiatives are necessary



Community network, experience

Zabbaleen are uneducated and waste collection is dirty



Complaints, media

Private sector

In the private sector stakeholders relate to the Zabbaleen and all related commercial partners. The Zabbaleen play a dual role, first as entrepreneurs needing to generate an income for their livelihoods, secondly as inhabitants in a polluted area. In a meeting organised by the Tadamun Initiative, Zabbaleen actually suggested to formalise the waste economy (2020, Section 5): "A formal economy would enable the state to benefit from the area's projects and products, as well as organize professions and allow the workers to enjoy the privileges of official work". The Zabbaleen have sought official recognition, especially since many private companies in waste management are already commercially registered and paying taxes. They aim to become partners, rather than competitors, in Cairo's waste management system and aspire to develop and expand the recycling industry further.

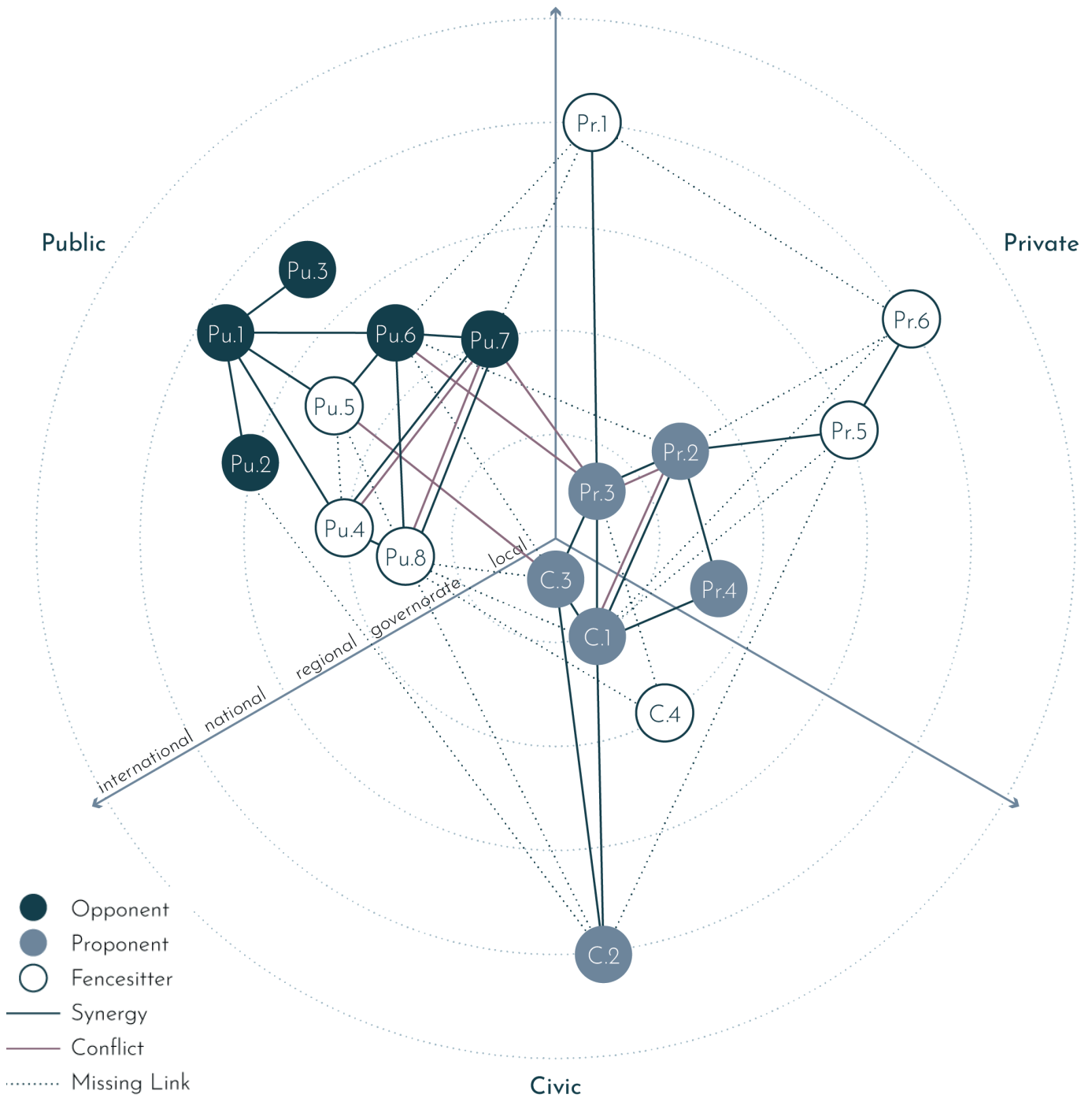
Important stakeholders in the recycling industry are the companies that buy the recycled materials and produce new products. Their main incentive to make profit in a competitive economy, also by benefiting from cheap labour. During my fieldwork, Zabbaleen explained that buyers are from Egypt as well as abroad, ranging from bottle manufacturers to companies like Ikea.

Civic sector

In the civic sector mostly NGOs and local organisations are active, concerned with the general well-being and environmental quality of Zarayb. The most important civic stakeholder is the Association for the Protection of the Environment (A.P.E.) founded in 1984, that specifically targets the well-being and environmental needs of the Zabbaleen community with educational programs to supporting women and children in health and skill development related to recycling practices. They have a compound in the north of Zarayb where mostly women make local products from textile, paper and glass.

Other important NGOs are the World Bank, the German gesellschaft für internationale zusammenarbeit and UN-Habitat. They have initiated and been involved in projects from the 1970s and 1990s respectively. These focussed on development, sanitation and community participation.

Stakeholder Relations



- Opponent
- Proponent
- Fencesitter
- Synergy
- - - Conflict
- Missing Link

- PU.1** SPCUD
- PU.2** MHUUD
- PU.3** Ministry Planning
- PU.4** Ministry Local
- PU.5** UDF
- PU.6** GOPP
- PU.7** NUCA
- PU.8** Local Administration

- Pr.1** Researchers
- Pr.2** EPC
- Pr.3** Zabbaleen
- Pr.4** Wahiya
- Pr.5** Recycling companies
- Pr.6** Manufacturing companies

- C.1** A.P.E.
- C.2** NGOs
- C.3** Local organisations
- C.4** Cairenes

Onion diagram

Stakeholder Relations

In this relational diagram the stakeholders from the different sector are shown through the scales, ranging from international to local. In the Public sector all governmental bodies are shown, who mostly operate on a national level. Not all stakeholders are opponents of further local development of Manshiet Nasser, improving the waste management system and achieving environmental justice in Zarayb. Especially the local government is interested in addressing challenges related to informal settlements, not only through resettlement, but also through local projects. To achieve this, there are especially missing links between organisation with on the ground experience and networks, such as NGOs, but also the Zabbaleen community itself, and their companies.

This aim of local development, actually conflicts with the national goal of urban expansion, which is mostly executed through New Urban Communities Authority. An opportunity would be to involve the UDF and let them take a more active stance, especially in terms of financial resources, to stimulate local projects, while national policies can still be executed.

On the other side of the diagram, there are powerful stakeholders in the private sector, mainly recycling and production companies, that operate on a national and international level. Their stance in the global market and their connection to the Zabbaleen, can make them (financial) partners in improving the recycling industry, consequently also improving the living conditions of the Zabbaleen.

Power-Interest

Status quo

The various stakeholders in the objective of further local development of Manshiet Nasser, improving the waste management system and achieving environmental justice in Zarayb, can be broadly categorized into three groups: powerful players, international organisations, and local players.

The Egyptian government and companies are the powerful players. The Egyptian government is an opponent of these changes, while private companies are mostly fence-sitters, waiting to see how policies will change, favouring their profit over working conditions.

In contrast, international organisations such as the UN, EU, and various NGOs are mostly proponents of the proposed changes. Their support stems from human rights to stable income and physical and psychological well-being. While these organisations possess significant reputational power and can influence public discourse, they lack executive authority in Egypt. This means they can increase international awareness and pressure the Egyptian government to act, but cannot enforce any legal actions.

On the local level, the small players, the Zabbaleen, the Wahiya, the EPC and civilians, are proponents as well. Here, income is the main motivator, since better physical and psychological well-being should not come at the cost of their livelihood. However, the internal power structures within the Zabbaleen community also influence this dynamic. For instance, Wahiya and the EPC benefit from the current system of cheap labour. Cairenes households profit from free waste disposal, all the while looking down on this work and adapting a 'Not in My Backyard' kind of attitude.

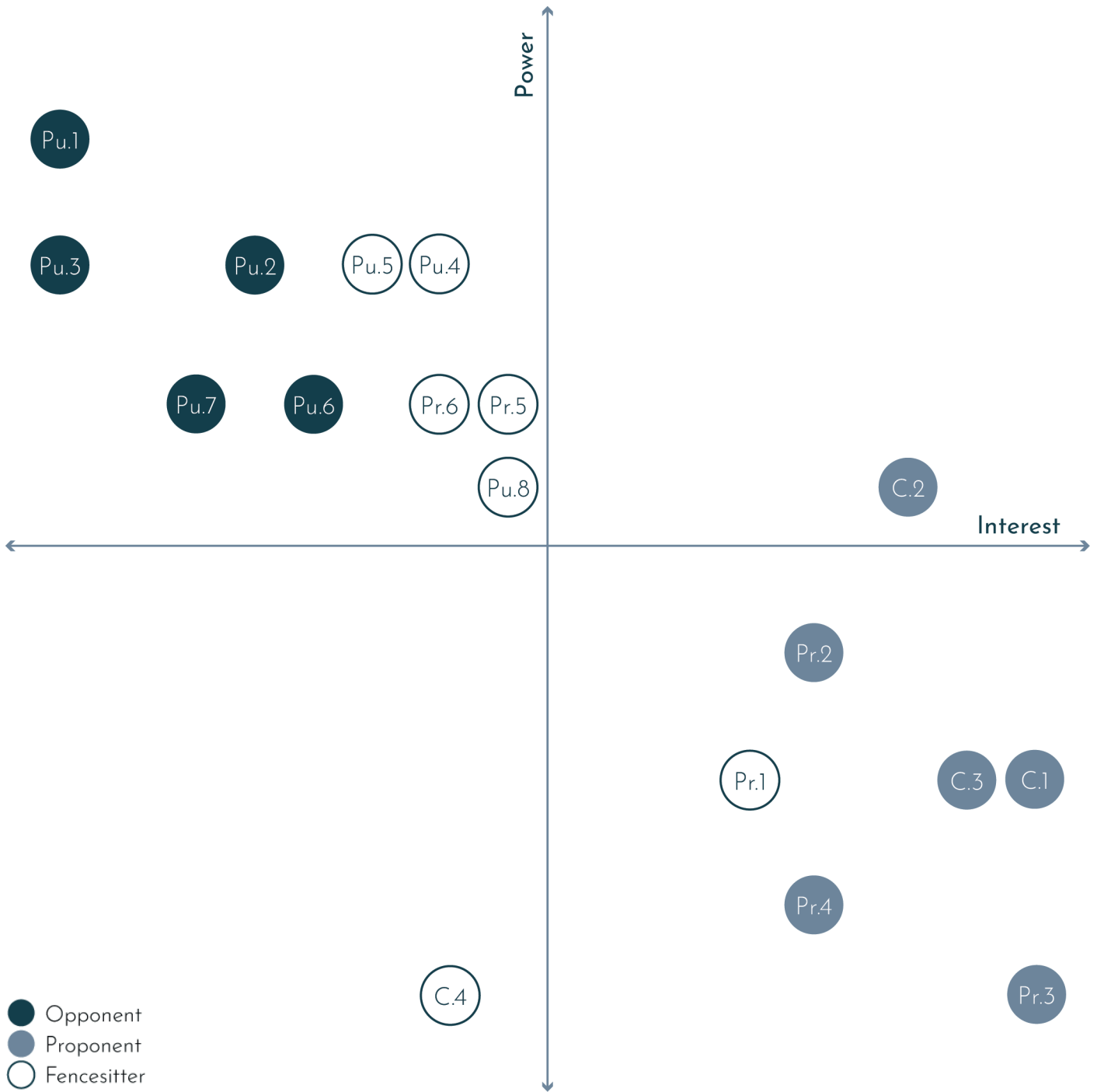
Mobilisation

Mobilising stakeholders by knowing their objectives and personal interest, is essential to motivate them for systematic change. The powerful opponents and proponents, such as the Egyptian government and private companies, need to be persuaded to support through money-returning investments. Examples are: recycling companies benefitting the national economy, or an optimised local recycling chain increasing income for private companies.

On the other hand, the powerful proponents, including the UN, EU, and NGOs, should use their influence to both persuade the opponents and empower the weaker actors. Knowledge and network of researchers can be used to raise public (international) awareness, collaborating with local actors, and providing necessary resources and education.

Moreover, it is crucial to empower the weak actors so their voices can be heard and taken into account in the decision-making process. This involves collaborating with powerful proponents, engaging in collective design, and stimulating mindset changes through education. By working together, these diverse groups can drive meaningful progress in improving the conditions in Zarayb.

Power-Interest Status Quo



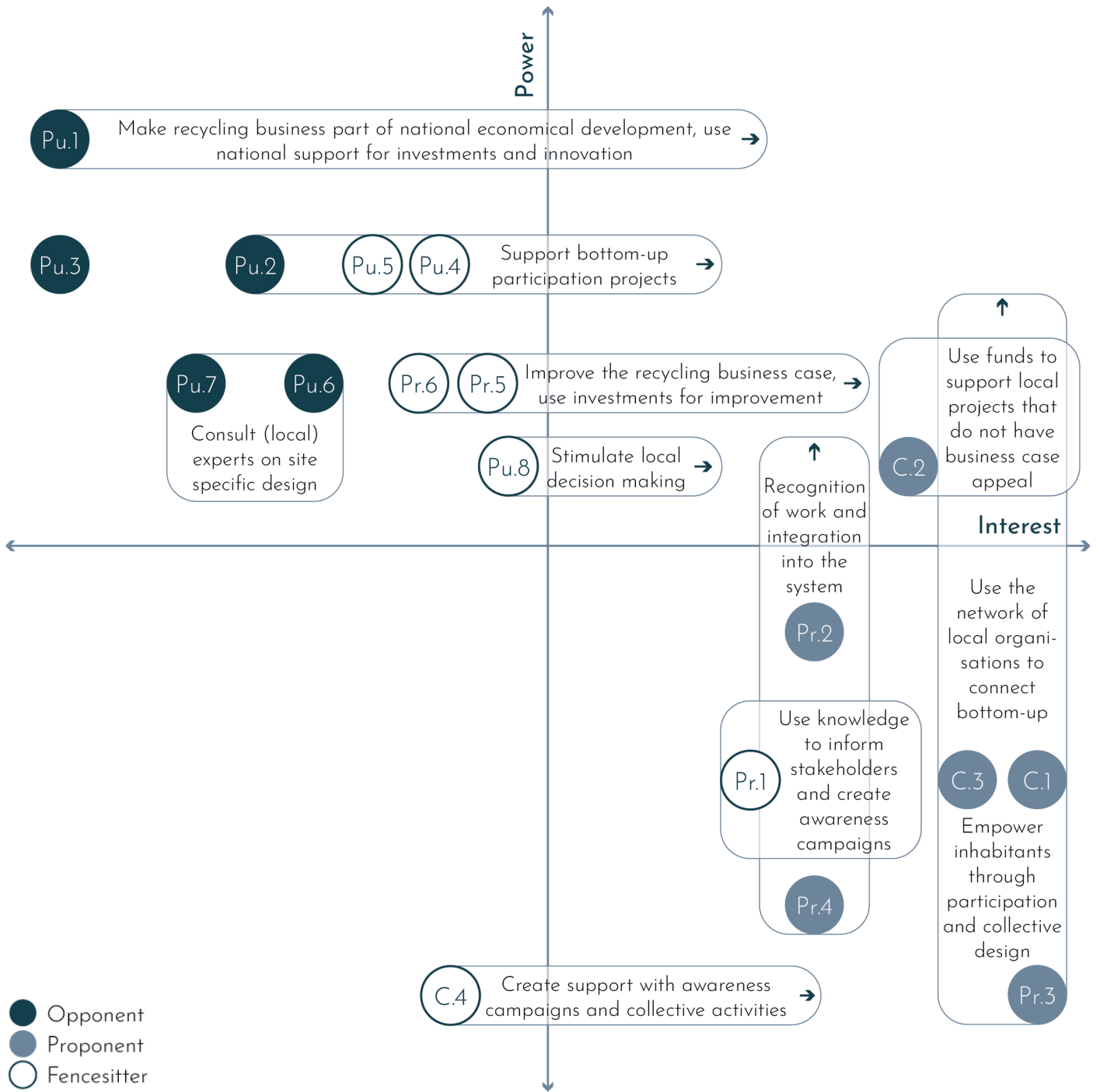
Stakeholder power-interest on urban interventions for environmental justice in Zarayb

- PU.1** SPCUD
- PU.2** MHUUD
- PU.3** Ministry Planning
- PU.4** Ministry Local
- PU.5** UDF
- PU.6** GOPP
- PU.7** NUCA
- PU.8** Local Administration

- Pr.1** Researchers
- Pr.2** EPC
- Pr.3** Zabbaleen
- Pr.4** Wahiya
- Pr.5** Recycling companies
- Pr.6** Manufacturing companies

- C.1** A.P.E.
- C.2** NGOs
- C.3** Local organisations
- C.4** Cairenes

Power-Interest Mobilisation



Mobilising stakeholders in power-interest on urban interventions for environmental justice in Zarayb

Subconclusion

The natural environment around Manshiet Nasser is heavily influenced by the arid desert climate, with sandy and limestone-rich soil that is unsuitable for greenery. The Moqattam mountain also poses significant risks to the area, with threats from rockfalls and landslides due to water seepage and construction of buildings. Implementing native plants and soil treatments could help create green structures that are more resilient to these conditions.

Although Manshiet Nasser lies on the urban periphery of Cairo, separated by cemeteries and highways, its location in the has improved due Cairo's urban expansion. Over time, the area has developed relatively high-quality buildings, which have similarity to Islamic Cairo and use vernacular methods to respond to the heat. However, this informality also brings challenges, particularly with limited accessibility. Some facilities and amenities have been introduced as well, though they remain limited in number and quality.

The Zabbaleen community earns its livelihood from recycling, playing an essential role in Cairo's waste management system. Families share responsibilities in various roles, bringing their work home. Men collect the trash with their trucks at night and women sort during the day. There is a variety of companies active in the area, from sorting, to specialisations in processing all types of waste. During this process inhabitants are exposed to hazards, such as fumes from the melting of plastic and metals. A.P.E. a local works on upcycling products, from paper and textiles, providing alternative jobs. On the downside, this type of work is not available for all families, requiring skill development , investments and a sales market. Despite these challenges, the Zabbaleen envision a better future for their children, stimulating education opportunities and developing industrial areas outside of the area.

The stakeholders have diverse perception of the problems within Zarayb. Overall most stakeholders agree that the challenge of the Zabbaleen lies in the environmental conditions of the neighbourhood, but the response to this issue differs.

Inhabitants are aware of the health hazards, but are required to overlook them to have an income. In order to strengthen their position in the housing and work market, the Zabbaleen have united in firms and unions. The different positions of power that are created within this system lead to conflict of interest on the local scale.

NGOs recognise the environmental and economic challenges and prioritise upgrading initiatives and community programs. However, they understand that structural change is necessary, rather than merely mitigating.

Manshiet Nasser has a long history of government intervention that disregards local needs and initiatives. The government sees relocation and new developments as the main solution and directs energy to the construction of public housing. Top-down urban upgrades have focused on physical infrastructure over social needs, often neglecting the importance of the Zabbaleen's work in waste management. Instead of recognising the Zabbaleen's contributions, the government has attempted to remove them from the system, threatening their livelihoods without providing viable alternatives.

Chapter 4 | Design

This chapter address sub-research questions four and five focussing on the synthesis of a design. First design goals are formulated as a response to the chances and challenges found in the analysis. Then a pattern language is created as an overview of the possible interventions read in literature and observed during fieldwork. Next the design goals and the related patterns are spatialised in Z̄arayb using optimisation. By overlaying these optimised maps strategic places for interventions are identified, resulting in a strategy map.

This strategy is then tested on the smaller scale in the form of an urban design. Here the different spatial elements of the new system come together and the phasing of the different patterns is shown.

In the last part of this chapter the urban design is assessed using the framework from Noll & Bahr (2023) for assessing environmental justice. Additionally there is reflected on the role of patterns in the creation of the design regarding the support of stakeholders.

Vision

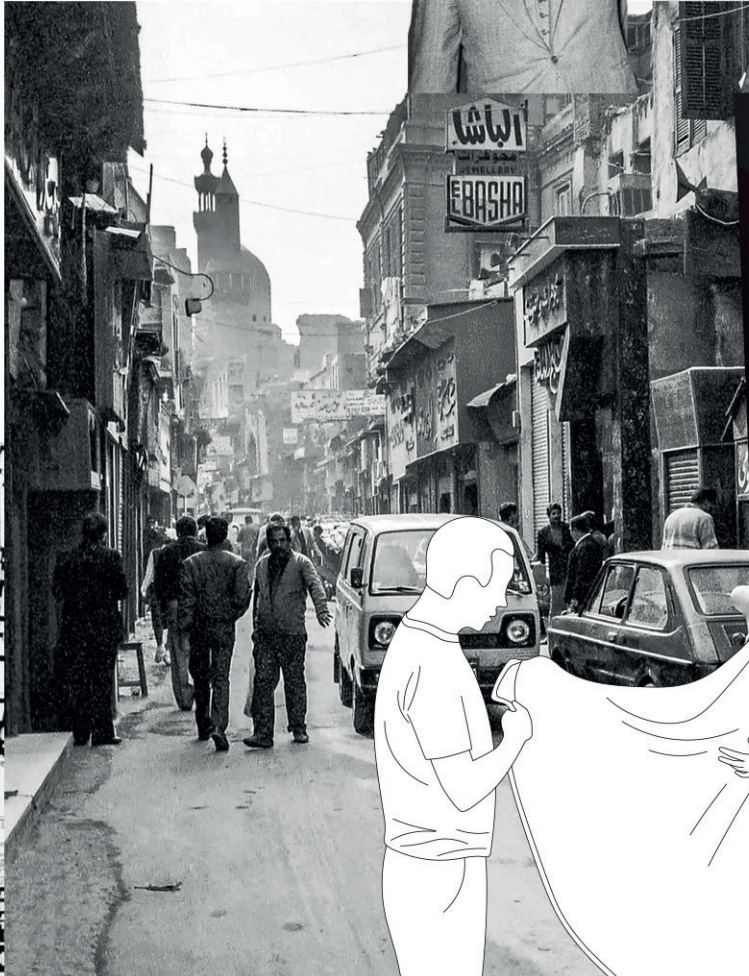
Sustainable Artisans

In 2050 Egypt has a strong economy. Egypt is the frontrunner in recycling and experts are deployed all over the world to share their knowledge with other countries. The cradle of this expertise lies with the Zabbaleen. They currently have a hundred years of experience in recycling and since the government decided to recognise the importance of their work and invest into their enterprises from 2025 the efficiency and functionality has improved dramatically. In addition, the government has promoted trash separation which makes collecting and processing easier.

The Zabbaleen are still living in Manshiet Nasser, but their neighbourhood has changed quite a bit. In the area live people from all levels of society, both lower and higher educated. However, all of them have the opportunity to finish high school and choose what life they want to live. Some decided to go into other jobs, while others have followed in the footsteps of their parents. They are running their families' recycle companies, manufacturing products or training other recyclers in parts of Egypt.

The neighbourhood no longer lies isolated from Cairo, but it has been attached to the formal structure of the city. New car roads, public transport lines, and slow traffic connections have made it possible to travel efficiently. In the area, the housing quality has improved, some streets were widened so emergency services can pass through, and several public and private green spaces have been added to the area. These green spaces vary from rooftop gardens, green streets and shared urban courtyards. One part of the area is mainly focussed on housing with several essential amenities, while another part of the area is the makers district. In this area small manufactures produce products, repair shops provide services and the bazaar sells locally made products, which are quite popular with tourists and local Cairenes. The work that takes place here is not polluting and safe to execute close to housing. Local families have collaborated to set-up more professional working grounds with safety procedures using funds provided to them by the government and NGOs. These co-working space provide working opportunities and access to essential amenities like day-care and playgrounds.

More polluting work has been moved to designated areas over the last 30 years. In these industrial areas specialists work with different types of trash to make raw material that can be used or sold. These specialist often live in the Zabbaleen area and take the work/ public transport line that takes them directly there.





Design Goals

The design goals are formulated as a response to the chances and challenges of the Zabbaleen community as found in the analysis.

In terms of network, Manshiet Nasser is a periphery within Cairo with an urban fabric similar to that of Islamic Cairo. The environment is heavily influenced by the desert with little greenery and risks from rockfall.

In terms of people and everyday life, Manshiet Nasser is home to diverse communities, with the Zabbaleen standing out as a particularly distinct group. Within the Zabbaleen community there are strong family ties present in both social life and work. The recycling business makes them financially independent, however it takes a toll on the health of inhabitants, therefore they wish for a different future for the next generation.

In terms of governance, the different stakeholders have conflicting objectives between the government, inhabitants, and businesses, on different scales. The area is subject to top-down approaches which results in physical upgrading that disregards on the ground needs.



Network



People & Everyday Life



Governance

1. Adapting the urban form

Responds to the desert climate and temperature increase as well as urban disconnect and accessibility to the city. The interventions related to these challenges adapt the urban fabric for cooling down, create space for green and make network improvements that attach the area to the formal city.

2. Acknowledging the community

Responds to governmental ignorance and community stigmatisation. The interventions related to these challenges focus on institutional recognition by issuing legal papers to its residents, providing space for community by housing their activities and stimulating self-development to give (future) generations the same opportunities as other Cairenes.

3. Optimising the recycling chain

Responds to income security and business opportunities as well as environmental health hazards and changes on global waste market. Rather than removing work opportunities, efforts should address hazardous activities and increase the density of the area to support sustainable growth. The interventions focus on increasing hygiene and health, specialising the workforce and stimulating innovation.



Adapting Urban Fabric

Cooling Down
Space for Green
Attaching to city



Acknowledging Community

Institutional recognition
Space for Community
Stimulating Self-development



Optimising Recycling Chain

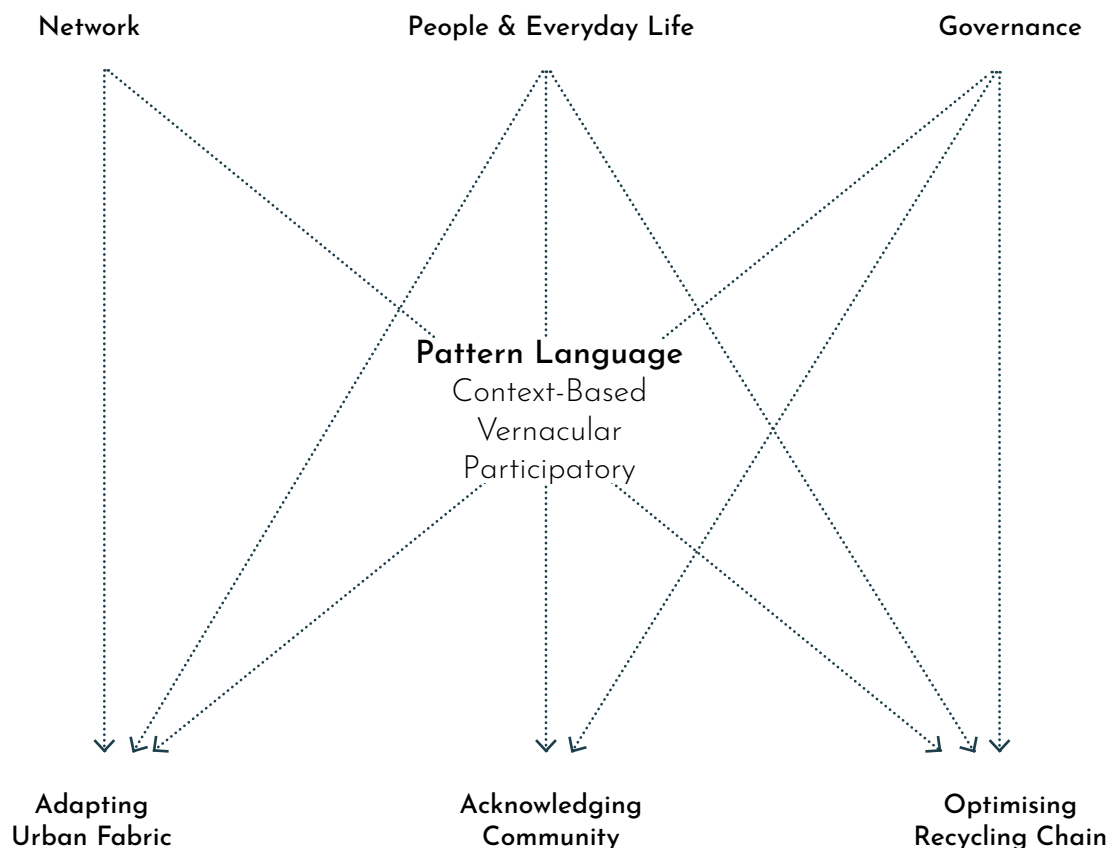
Hygiene & Health
Specialising Workforce
Stimulating Innovation

Pattern Language

Pattern Language was developed by Christopher Alexander to create a system of design principles based on recurring and context-specific solutions to common problems in the built environment. A pattern describes the relation between theory and design related to the overall topic of the pattern set.

In the case of this thesis the theory is derived from literature reviews and fieldwork observations that relate to designing for environmental justice in informality. The patterns in this pattern language are related to one or more of the approaches of participatory, context-based and vernacular design. Since all these patterns are related, they form a language that can be used by designers as well as other stakeholders to design urban spaces.

Each pattern contributes to one of the design goals of adapting the urban form, acknowledging community, and optimising the recycling chain, and is part of a pattern set. A pattern set is a combination of patterns that supports actions as part of achieving the design goal. Depending on the goal the patterns can be reshuffled by designers, inhabitants or other users to create new sets.

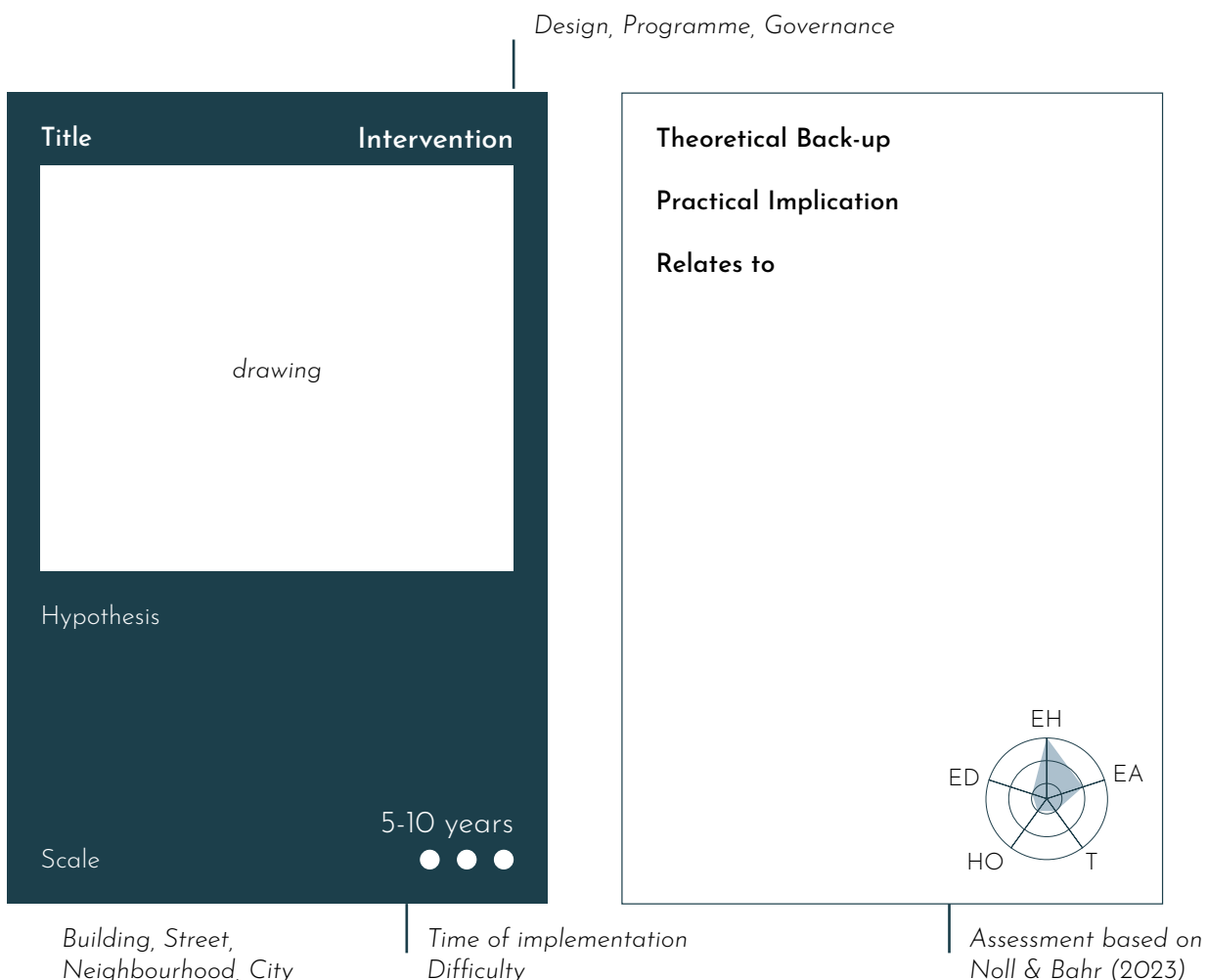


Pattern Card

I designed patterns in the form of a card as a small communication tool based on Bechmann (2023), as seen in the image below. The front side explains the pattern in a nutshell, giving a title, the type of intervention, the hypothesis, the scale and the implementation time of the pattern. This timespan refers to the time that would be needed to implement a pattern. The difficulty refers to the resources and support needed to implement a pattern.

As a consequence, there are patterns with a short implementation time, but high difficulty, which means they could remain on the shelf until the right resources and support are available.

The backside contains more information on the theoretical background based on literature research or the site visit, practical implication in space and the assessment in the context of Environmental Justice. The assessment is based on the five categories from the framework for Equitable Cities by Noll & Bahr (2023). Each pattern is rated based on this framework and the assessment diagram on the back. The Pattern Language, all pattern relations and the (academic) sources can be found in the pattern booklet.



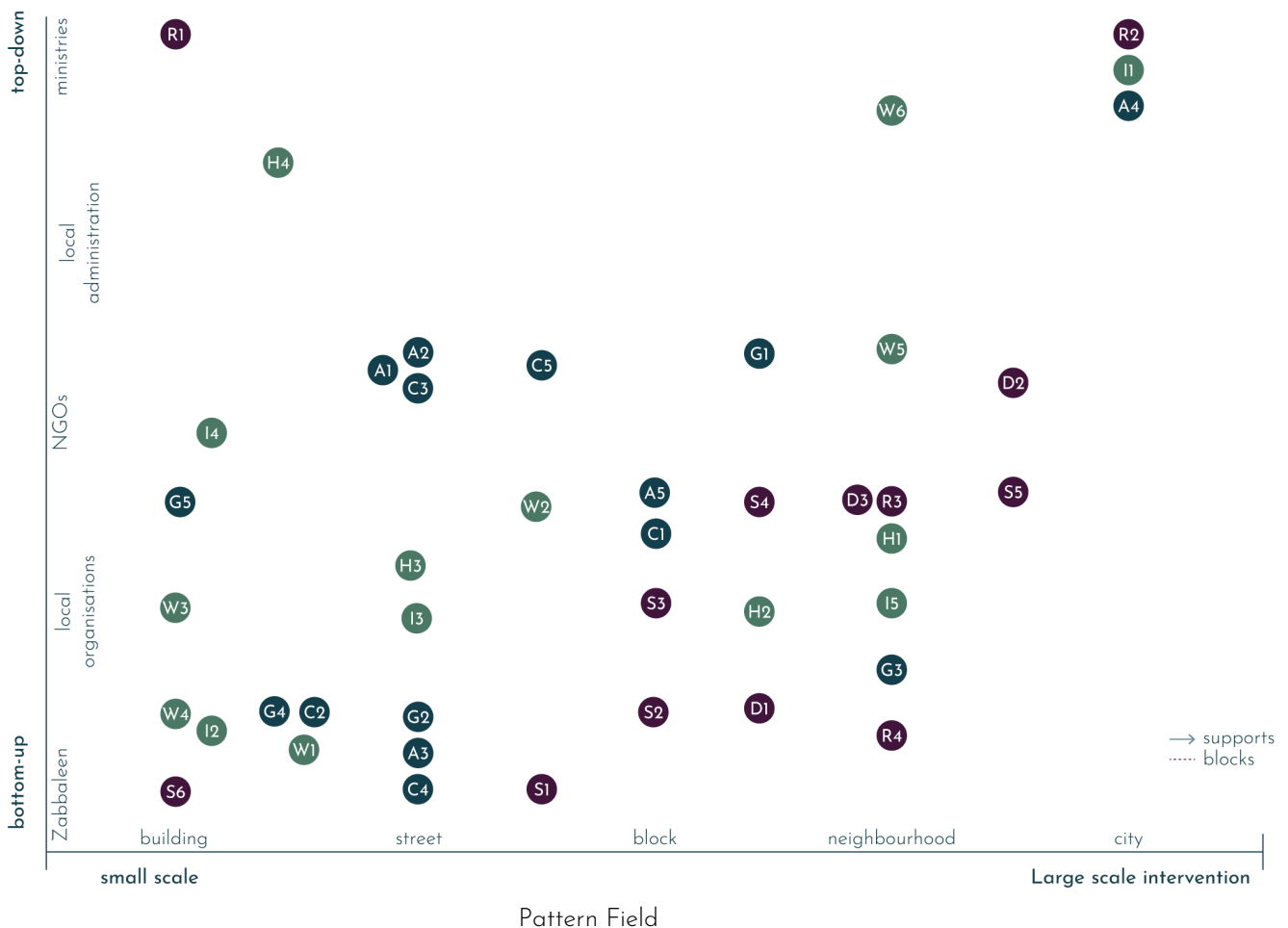
Pattern field

The pattern field shows the relation of patterns to each other. The patterns are organised from small scale to large scale implementation and from bottom-up to top-down, showing the stakeholders who are the main implementers of the patterns. Consequently in the bottom-left are patterns that can be implemented by the Zabbaleen on the building and street scale, while in the top-right are patterns that need to be implemented by the government on the city scale. The patterns are diverse in terms of scale, but mostly leaning towards bottom-up.

The implementation becomes more complicated when looking at the relations and the patterns that support or block each other. Some bottom-up patterns are supported by top-down patterns, and some small scale patterns are supported by structural changes on the larger scale.

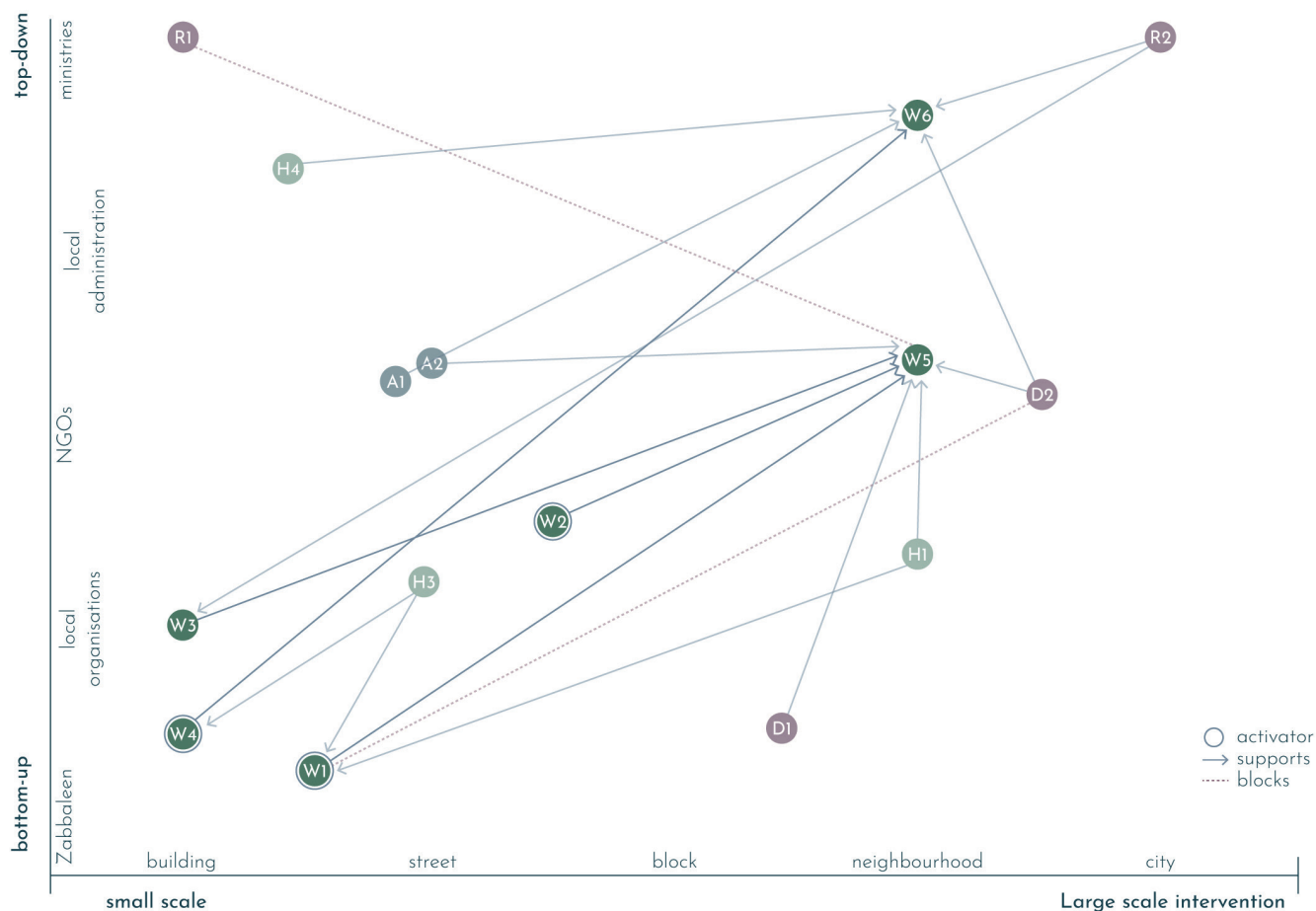
At the same time, some patterns compete for the same available space, and consequently block each other unless a compromise is found.

This shows the importance of a planning structure that creates various stakeholder support and compromises between spatial claims of different patterns.



An example of how the relations of patterns can become complicated is the pattern set 'specialising workforce', since the creation of a recycling and industrial zone requires a mindset change of the Zabbaleen, as well as financial support from the government. Bottom-up patterns relate to reinforcing the current recycling process (e.g. sorting, repairing and processing) in strategic spaces, whilst mitigating hazards and pollution. These spaces can then grow into specialised zones. Recognition of house ownership might actually block the development of the recycling zone, since some inhabitants will need to move their 'official' housing. Increasing the education quality might reduce the willingness of Zabbaleen to work as sorters, since it would give them other opportunities. However, education will increase other types of business opportunities, relating to specialised work in upcycling, repairing and processing in specialised zones. Especially for the industrial zone government support is needed to create safe roads to connect the different working zones.

All relations of pattern sets can be found in the pattern booklet.



Pattern Field of set 'Specialising Workforce'

Spatialising Patterns

Spatialising patterns

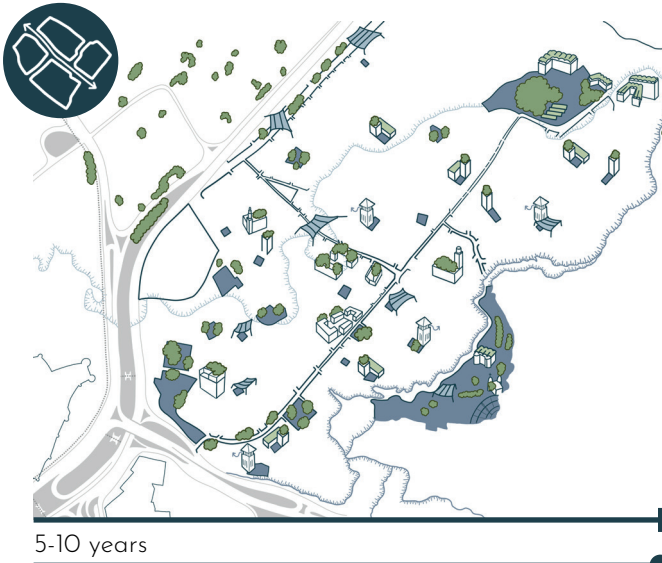
On the next few pages, I explored the spatialisation of patterns in response to the design goals. Each pattern has a scale of implementation, ranging from building to city level. However, the spaces where these patterns could be implemented varied depending on the specific pattern. For example, a green rooftop is suitable for private housing, while a community vegetable garden is more appropriate for a public building.

All design goals address trends identified in the analysis. The scenarios assume certain future trends, such as rising temperatures due to climate change and population growth, as inevitable. However, other future developments remain uncertain, such as potential changes in the waste and recycling market driven by regulations or innovations, or the continuation of trends like desert urbanisation.

Each scenario has a defined endpoint, or “end station.” This represents the stage where the possible developments in response to a particular trend reach their practical limits. Identifying these endpoints is crucial for informing the decision-making process in larger-scale strategic planning. All scenarios begin with a bottom-up approach, which could evolve into top-down improvements at a larger scale, depending on stakeholder involvement.

I utilised findings from fieldwork, satellite maps, and the ‘transformability index at the building scale’ maps from Mohamed et al. (2022) as an underlay. These maps categorise buildings’ transformability as low, medium, or high, based on their morphological analysis.

Overview

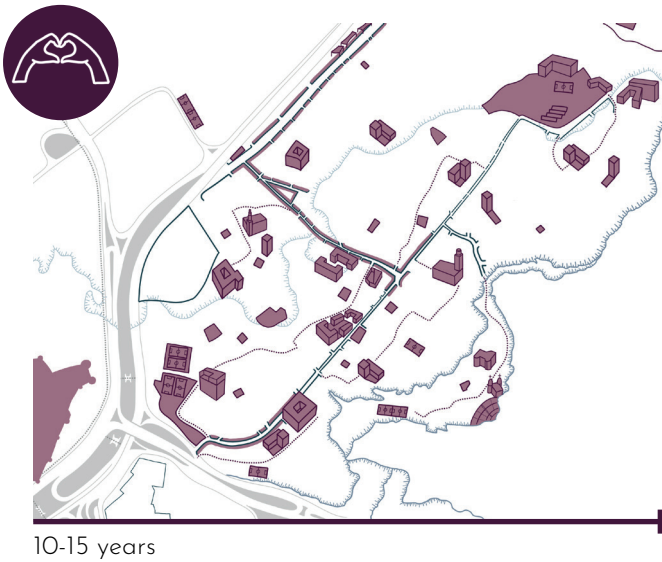


Response to Desert climate and temperature increase

Approach Bottom-up
Top-Down

Space Void [potential]
Rooftop collective
Rooftop private
Building
Street
Non-spatial

End Station No institutional recognition for large scale interventions

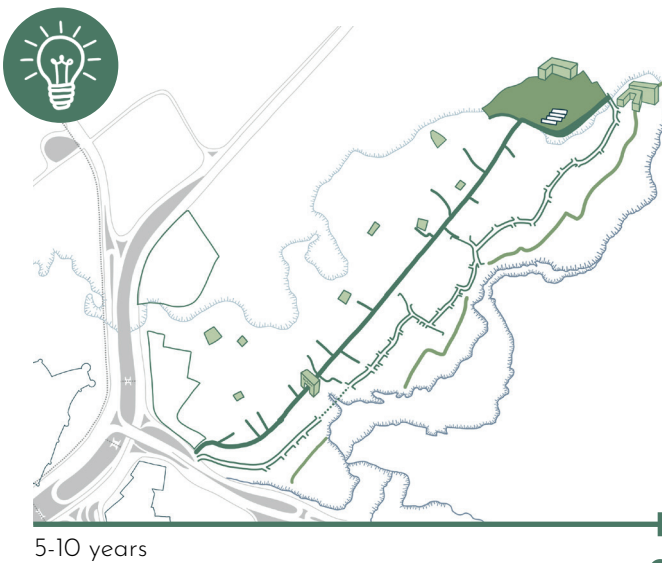


Response to Governmental ignorance and community stigmatisation

Approach Bottom-up
Top-Down

Space Void [potential]
Rooftop collective
Rooftop private
Building
Street
Non-spatial

End Station No actions against climate change and environmental pollution



Response to Income security and business opportunities

Approach Bottom-up
Top-Down

Space Void [potential]
Rooftop collective
Rooftop private
Building
Street
Non-spatial

End Station No institutional recognition for large scale interventions



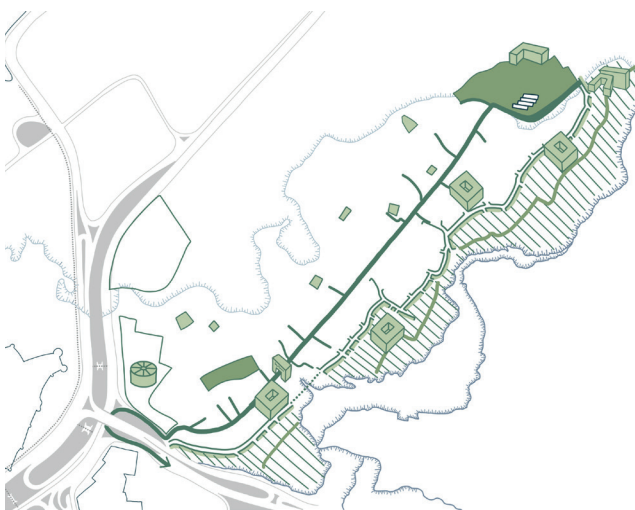
10-15 years

Response to Urban disconnect and accessibility to the city

Approach Bottom-up
Top-Down

Space Void [potential]
Rooftop collective
Rooftop private
Building
Street
Non-spatial

End Station Top-Down formalisation causing gentrification without tenure security



15-20 years

Response to Environmental health hazards and changes on global waste market

Approach Bottom-up
Top-Down

Space Void [potential]
Rooftop collective
Rooftop private
Building
Street
Non-spatial

End Station Business case at cost of residential development and community support

Adapting the urban fabric

Adapting to the desert

This first scenario addresses rising temperatures and the arid desert climate. It draws on patterns inspired by the work of Lotfata et al. (2024), who focus on redesigning street typologies to improve cooling; Hassan et al. (2015), who examine modern urban plans influenced by traditional Egyptian designs; and Khalil et al. (2018), who study urban climatic conditions in informal areas of Cairo. The patterns proposed in this scenario have a short implementation time and emphasise shading, ventilation, and vegetation. These patterns require minimal resources and can therefore be implemented through a bottom-up approach. They are typically applied to empty plots or rooftops of collective buildings, with the primary goal of enhancing greenery, ventilation, and water accessibility. However, the “end station” is reached if the government fails to recognise the housing tenure of residents. In such cases, investments are at risk due to the lack of guaranteed ownership and income security.



Urban Integration

In the second phase of this scenario, the public sector takes an active role by recognising the housing rights of residents and the value of the area as a residential neighbourhood. This phase focuses on connecting the neighbourhood to the wider city of Cairo and formalising essential infrastructure. Patterns in this phase have a longer implementation timeline, are more costly, and require expert knowledge as well as government approval. They are typically applied to streets, nodes, or rooftops of private buildings, further expanding the rooftop landscape. However, the “end station” is reached when the process of connectivity evolves into top-down formalisation, putting residents at risk of losing their income.



Due to changes in the neighbourhood, it can no longer be seen as an informal neighbourhood, so let's continue formalising and connecting it to the rest of Cairo



10-15 years

Acknowledging Community

Grassroots communities

This second scenario addresses governmental neglect and the stigmatisation of the community. It focuses on supporting the community's strengths and creating more opportunities through education. The key stakeholders in this scenario are NGOs and the inhabitants themselves, working within the civic sector. The patterns vary in terms of implementation time and complexity. Some patterns are easy to carry out, such as painting the walls of collective buildings or courtyards, while others are more demanding, like keeping plots vacant and redesigning them into shared courtyards, or constructing a community building.

In many ways, this scenario mirrors what is already taking place in Manshiet Nasser. However, the critical turning point is reached when temperatures continue to rise, and no actions are taken to improve the micro-climate. Additionally, the environmental pollution caused by recycling remains unaddressed.



Optimising the recycling chain

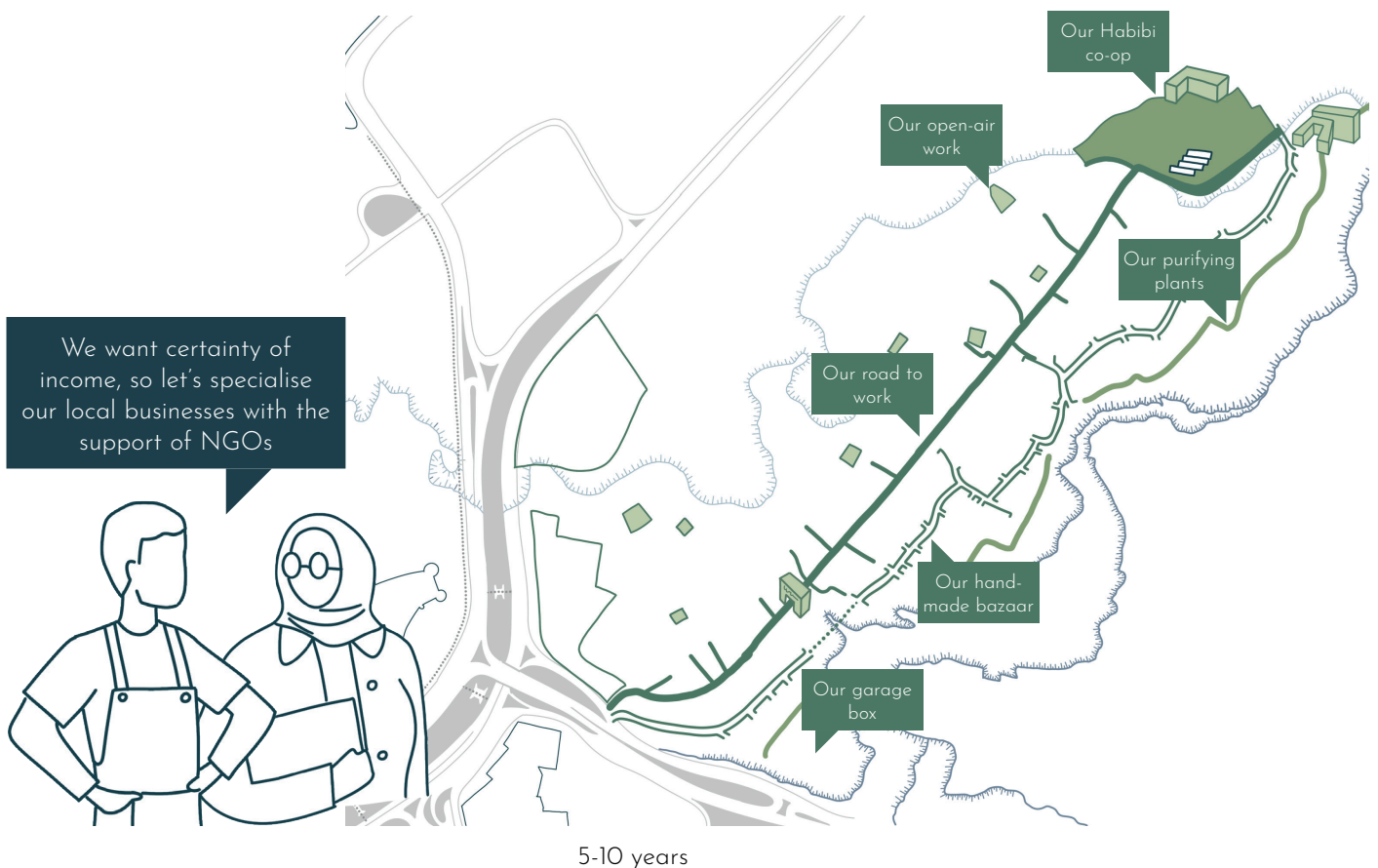
Industry under the radar

This third scenario addresses the need to guarantee income and formally recognise the Zabbaleen as crucial stakeholders in Cairo's waste management system. It focuses on improving business opportunities for the Zabbaleen, both within the private sector and through collaboration with NGOs in the civic sector.

Most patterns related to this scenario require mindset changes for the Zabbaleen and for society. For example, doing sorting work away from housing, or to separate waste in households in Cairo. To create a stronger and more durable business the Zabbaleen need to diversify their work: continuing to sort and process, but also upcycle and produce products locally. The focus is on creating working spaces, facilitating business partnerships, and exploiting tourism as another source of income. Patterns can be seen in streets, plots, or through collaboration in designated areas.

This scenario is interesting in the global context of waste management where waste is often shipped to other continents or countries. In 2022 the Netherlands shipped 170 million kilos of plastic even though 80% could be recycled locally (Lonkhuyzen, 2023). By examining the scenario of optimised recycling by the Zabbaleen, it presented ideas for managing waste locally.

The turning point in this scenario comes when the government fails to officially recognise the Zabbaleen's work, preventing larger-scale investments.



Production for Profit

In the second part of this scenario, the public sector becomes actively involved, recognising the Zabbaleen as key players in Cairo's waste management. It focuses on optimising the recycling chain, innovating further, and enhancing business opportunities. Patterns in this stage claim larger areas for recycling in the form of industrial zones outside of Zarayb, turning the area into a front-runner in recycling and attracting tourists to the production bazaar. However, the scenario reaches its end when the process of optimisation and profit generation comes at the expense of the environment, impacting health, housing, and making the area unprepared for the changing micro-climate.



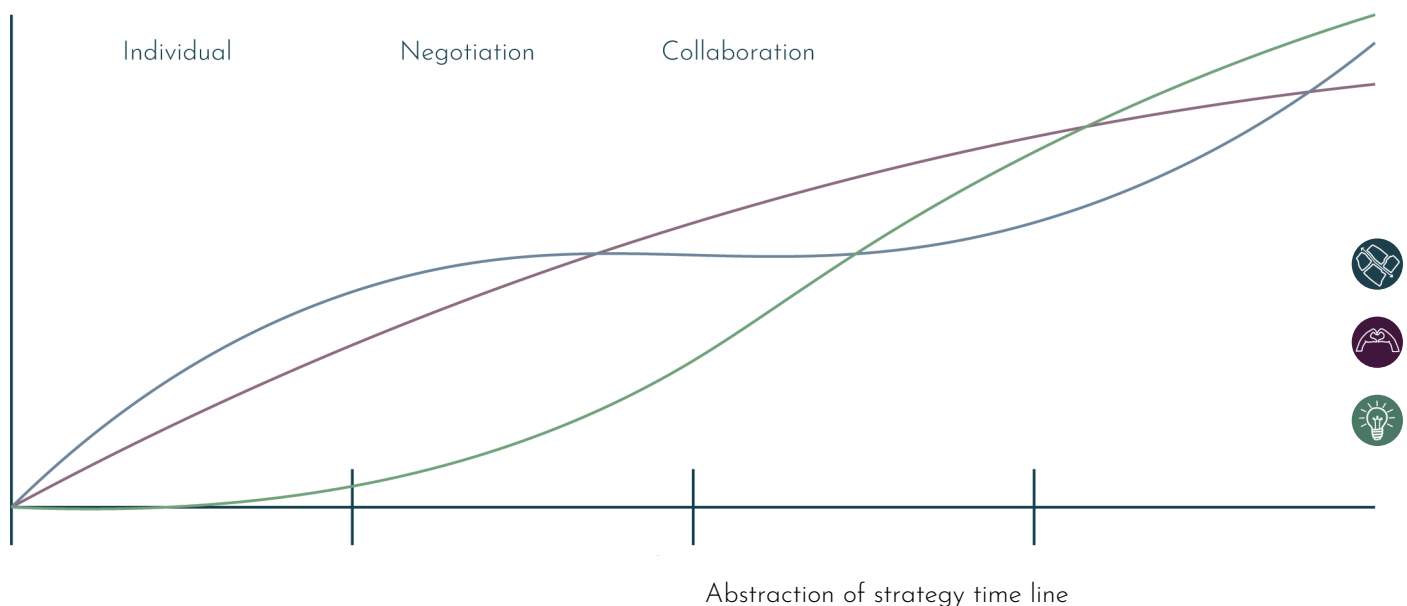
10-20 years

Strategy Sustainable Artisans

An integrated approach is essential to develop an urban design and planning strategy for Manshiet Nasser and the Zabbaleen community, that aligns with the vision created for Egypt by 2050. This approach combines economic, social, and spatial interventions to create a sustainable and equitable transformation for the community. Lessons can be learned from the transformation of the informal settlement Villa 31 in Buenos Aires, Argentina, into Barrio Mugica. In the case study of the UN environment programme the importance of simultaneously working on housing, infrastructure, and livelihoods to foster social and urban integration is addressed (Salat, n.d.).

In Barrio Mugica, improvements included upgrading housing quality, formalising land tenure, and integrating the area into the city's transport and service networks. Similarly, Manshiet Nasser requires better connectivity to Cairo's formal infrastructure, with new roads, public transport, and slow-traffic routes enabling efficient travel. Barrio Mugica's emphasis on preserving the community's identity while creating spaces for economic activity is a model for the Zabbaleen, whose expertise in recycling is crucial. A dedicated makers' district and professional workspaces in Manshiet Nasser can mirror Barrio Mugica's mixed-use areas, supporting local enterprises and training centres. By integrating Manshiet Nasser into the city's formal systems while preserving its economic and cultural uniqueness, the Zabbaleen's neighbourhood can evolve into a resilient and inclusive urban hub, driving innovation and recycling expertise worldwide.

Important to note is that the commitment of the government to this initiative was crucial for financing as well as executing the plan. Therefore the strategy for Manshiet Nasser draws heavily on bottom-up initiatives by NGOs and inhabitants in the beginning. Larger scale implementations happen later, since these require more financial means and greater support. The process of individual projects, negotiations conflict of interest and conflicting spatial claims, finally resulting in collaboration is visualised below.



Strategy map

Visiting Khan El-Khalili

Connecting through the cemetery to Islamic & Down Town Cairo with slow traffic routes

Open green

Connecting Al-Azhar Park and the Citadel of Saladin North-South, and the cemetery with a East-West green walking route

Untangling the Node

Connecting Citadel of Saladin, Al-Azhar Park and the Cave Church with walking bridges and public transport, as well as providing connections to the industrial areas out of the city

Recycling Zone Zarayb

Aim at creating a recycling zone for non-hazardous waste in Zarayb, making use of sorting, recycling and upcycling with a green street as buffer

Buy on our Bazaar

Creating a new tourist attraction with recycled products, functioning as a connector from the Citadel to the Cave Church





Next stop university

Connecting through the cemetery to Ain Shams University and metro station Abdou Pasha

Strolling along the avenue

Strengthening the cafés and park alongside the old tram track as recreational space for walks connecting to public transport and important roads

Connecting Communities

Creating a walking route between community focus areas in different neighbourhoods

Housing generation next

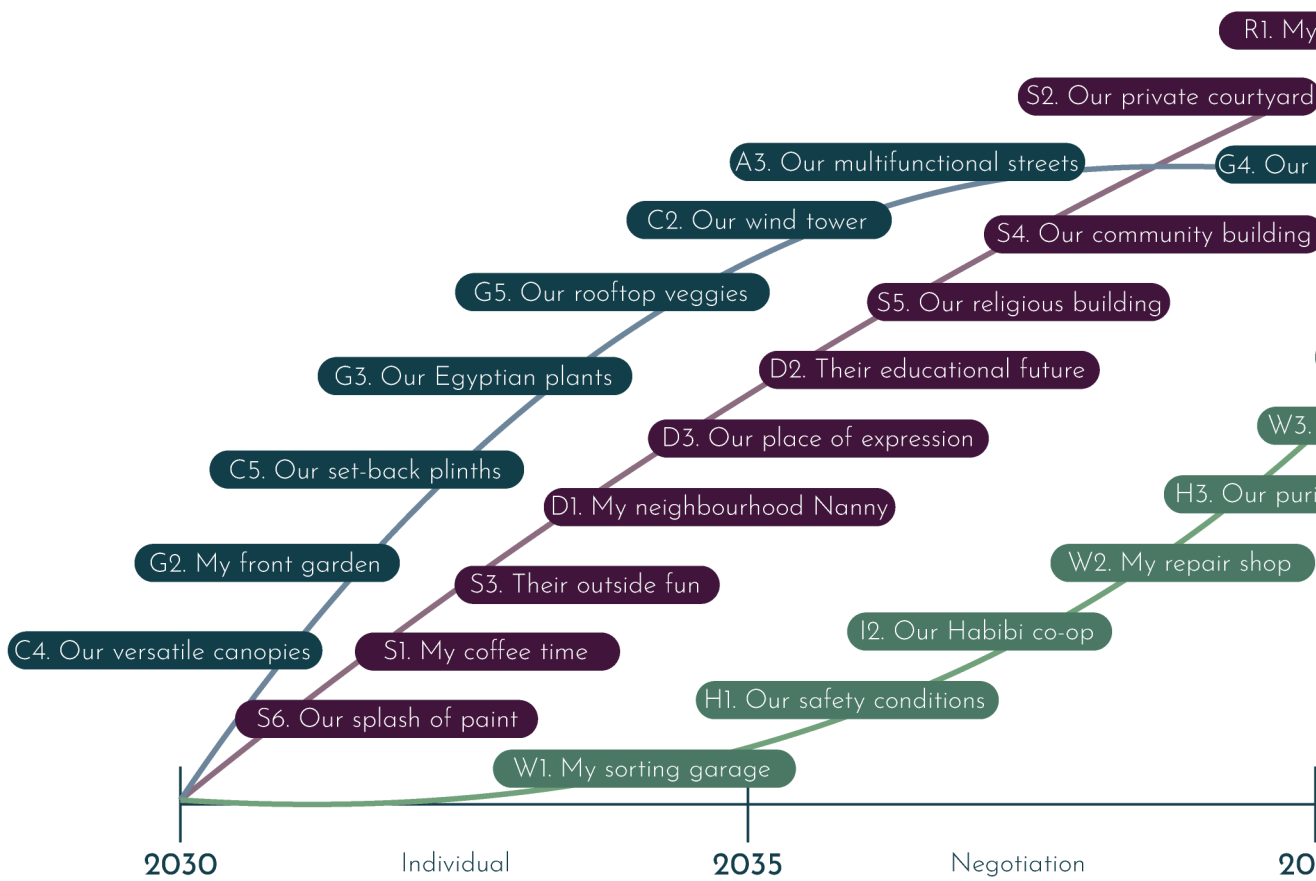
Anticipating on population increase with new public housing designed with the community

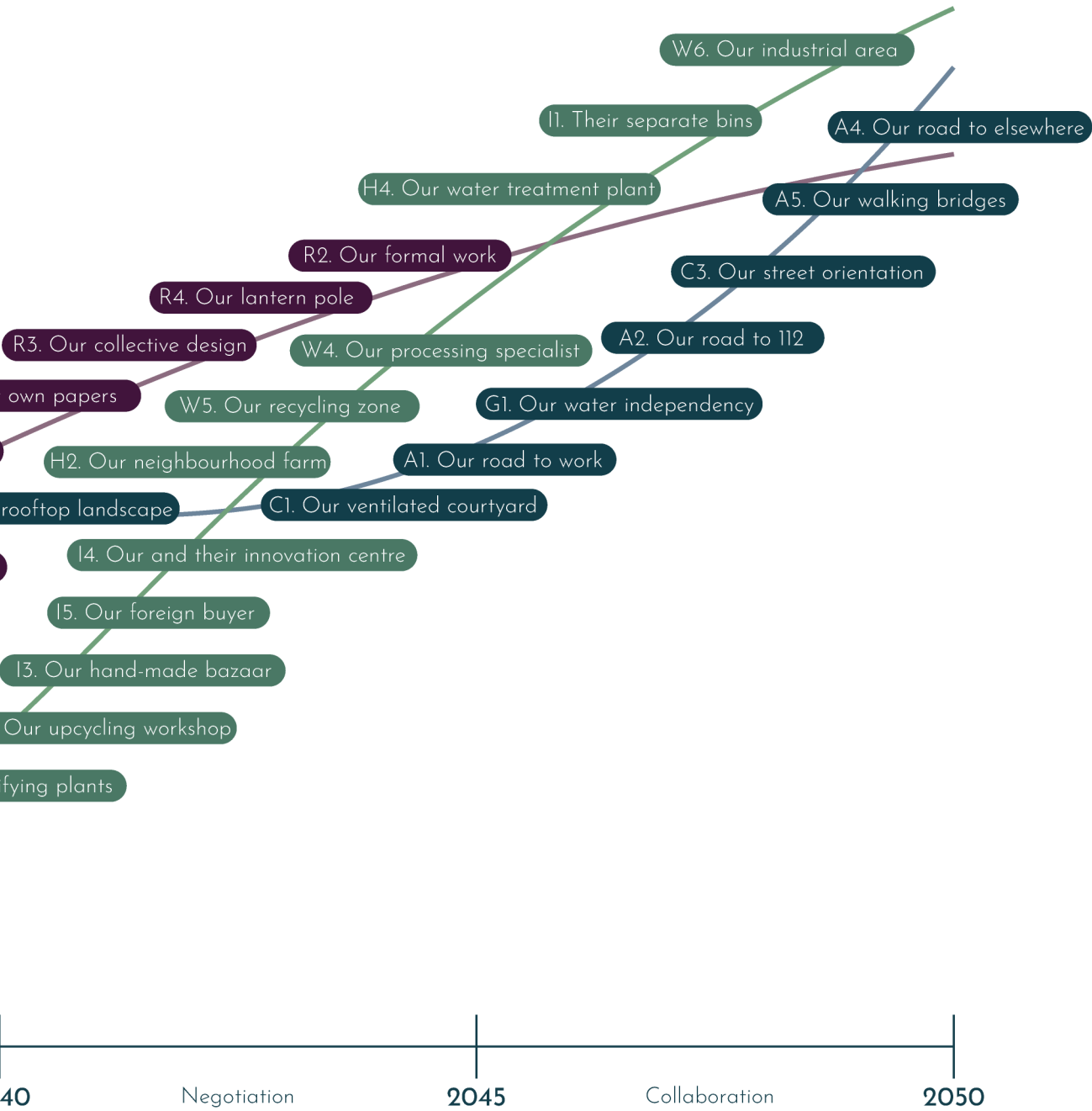
Legend

- Zaryb housing zone
- Zaryb recycling zone
- Park
- Community attraction
- Privately owned terrain
- Urban connection: streets
- Community connection: walk
- Recycling connection: bazaar
- Urban intervention
- Urban densification
- Community focus area
- Recycling innovation centres
- Public Transport stop
- + Healthcare

Strategy map

Strategy phasing





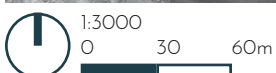
Case Study

The site is located in the recycling zone of the design strategy. It lies on crosspoint of the bazaar, close-by the new access route for pedestrians over the Moqattam ridge to the cave church, to connect tourists from the Citadel of Saladin to Zarayb.

It is one of the newest areas of Zarayb, developed between 2011 and 2016 (Mohamed et al., 2022). It lies close-by the most Southern entrance to the area, next to al-Moqattam street that, that is used as main entry way by Zabbaleen coming back from garbage collection.

It is still in the development phase, with many houses having only two stories and shacks built in open spaces (figure 39) and under the Moqattam cliff. Many houses are unfinished, with garbage not only piled in the streets, or on top of the building, but on all levels. Several families keep animals, such as pigs and goats that eat the organic waste with the other trash. Some bigger sheds are used for recycling paper, but most of the work done here is related to sorting. Recycling further down the chain, is more costly, since it requires investments in the right machinery. During my site visit in 2023, several children were running around in the street, during the day, or helping out parents with sorting.

The larger site is shown on the map below and a bird view analysis can be seen on the next page. The site is interpreted and valued differently by the stakeholders, which are represented based on the analysis.



Intervention location (ESRI imagery)

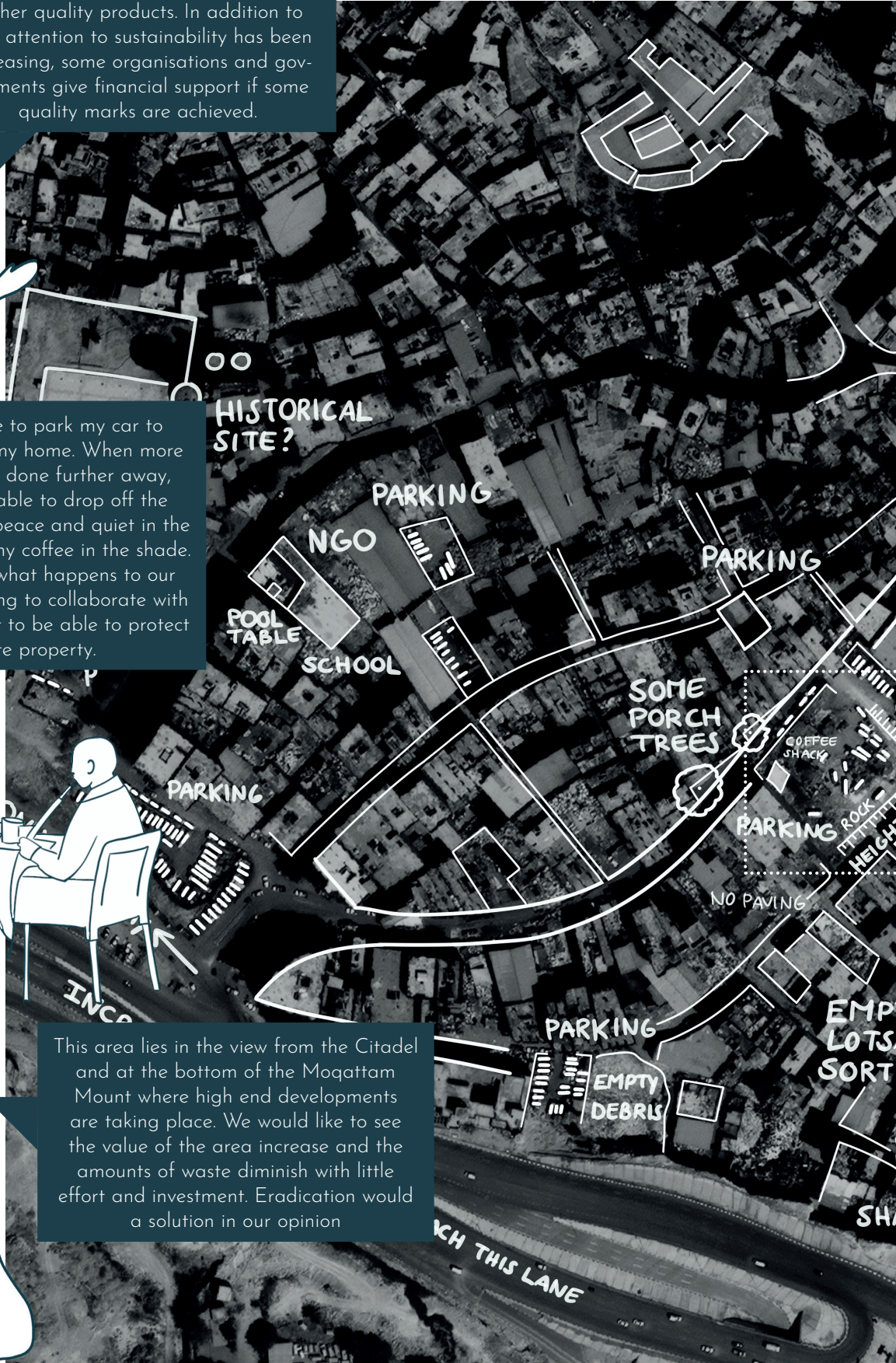
We buy from many small recyclers in this area, so long as they deliver the goods, we are not really interested in the working circumstances. However, some properly controlled materials make higher quality products. In addition to that attention to sustainability has been increasing, some organisations and governments give financial support if some quality marks are achieved.



I need to be able to park my car to bring the trash to my home. When more hazardous work is done further away, I still need to be able to drop off the good. I want some peace and quiet in the afternoon to drink my coffee in the shade. I also care about what happens to our home. If we are going to collaborate with other people, I want to be able to protect my private property.



This area lies in the view from the Citadel and at the bottom of the Moqattam Mount where high end developments are taking place. We would like to see the value of the area increase and the amounts of waste diminish with little effort and investment. Eradication would a solution in our opinion



A large part of this areas is still under-developed, since it starting construction in 2011. It has more left-over trash than other parts, some streets are muddy due to a lack of sewage and paving, it still has many shacks and there are less stores and facilities



I need to help around the house, but I also want to play, go to school and religion class. My school is on the other side of the street, so I have to watch the cars when I walk. I play inside or on the street with my friends, because there is no playground, some of the older kids play pool on the roof.

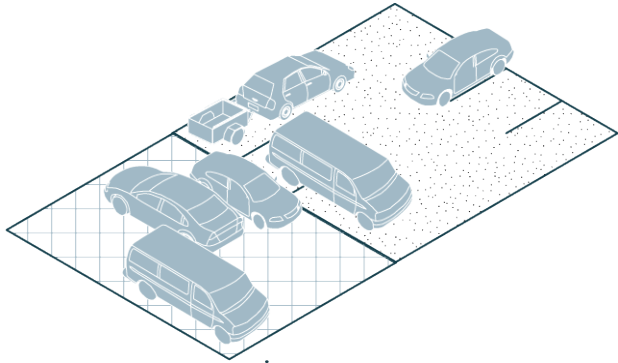


I need to be able to work, either sorting the trash or producing a new products. If safety conditions are going to increase I still need space to work and store the sorted trash. I would be open to other work, but who is going to teach me? How will I be able to make an investment? Where will I sell my products? Plus I need to watch my children.

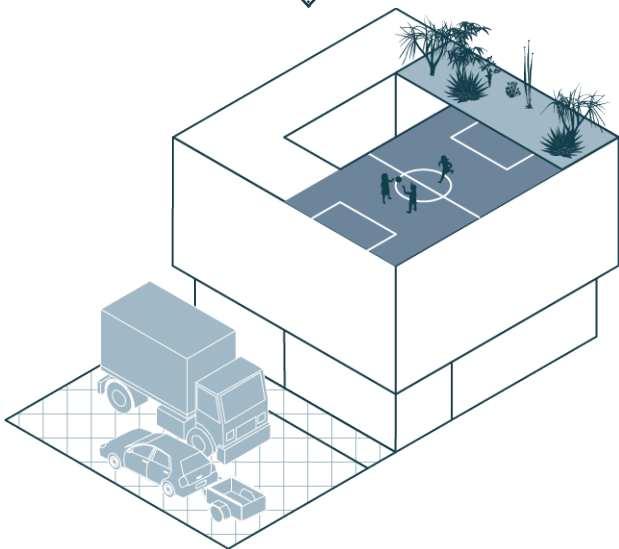


Analysis intervention site (ESRI imagery)

Systematic changes

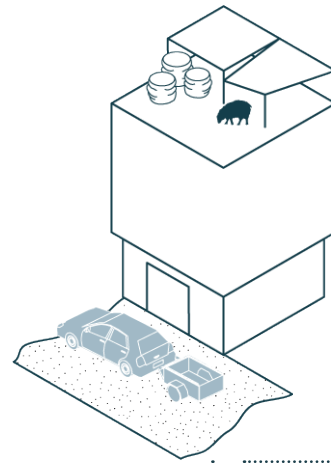


- S6: Our splash of paint
- C4: Our versatile canopies
- S1: My coffee time
- S3: Their outside fun
- A2: Our road to 112
- S4: Our community building
- D1: My neighbourhood Nanny
- G5: Our rooftop veggies

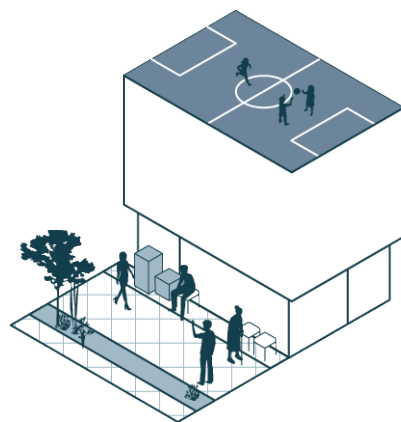


Innovation centre

Creating a place for sharing knowledge and innovating in the recycling process

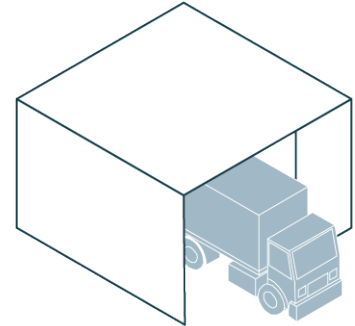
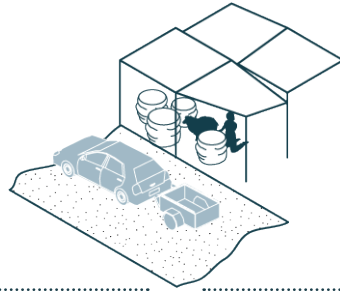
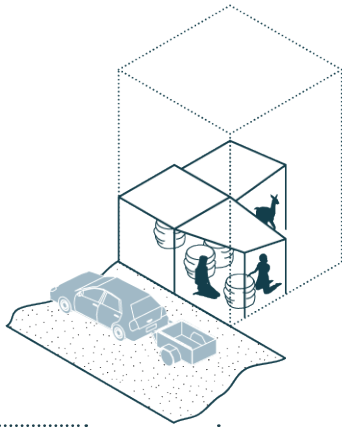


- C4: Our versatile canopies
- G2: My front garden
- W2: My repair shop
- W3: Our upcycling workshop
- R1: My own papers
- G3: Our Egyptian plants
- G4: Our rooftop landscape
- A5: Our walking bridges

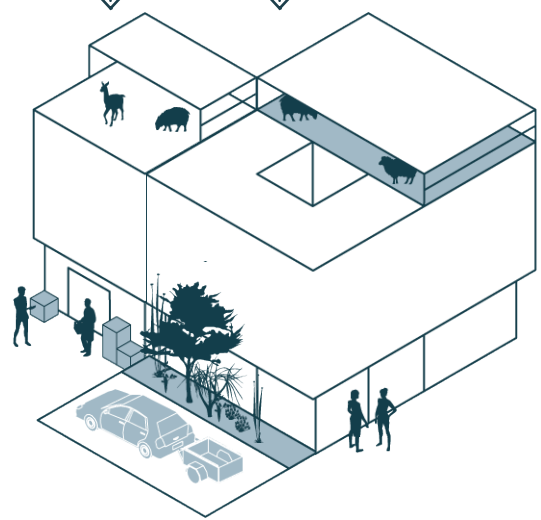
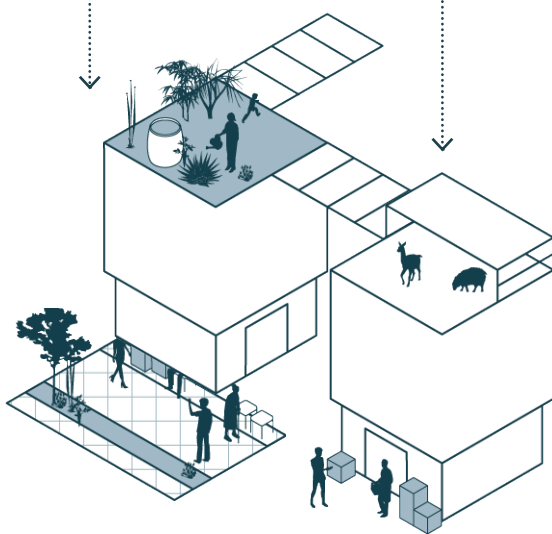


Connecting Communities

Creating a walking route between community focus areas in different neighbourhoods



- I2. Our Habibi co-op
- A1. Our road to work
- H3. Our purifying plants
- W2. My repair shop
- W4. Our processing specialist
- W5. Our recycling zone
- R2. Our formal work
- W6. Our industrial area



Buy on our Bazaar

Creating a new tourist attraction with recycled products, functioning as a connector from the Citadel to the Cave Church

Recycling Zone Zarayb

Aim at creating a recycling zone for non-hazardous waste in Zarayb, making use of sorting, recycling and upcycling with a access street with green buffer

System | Current

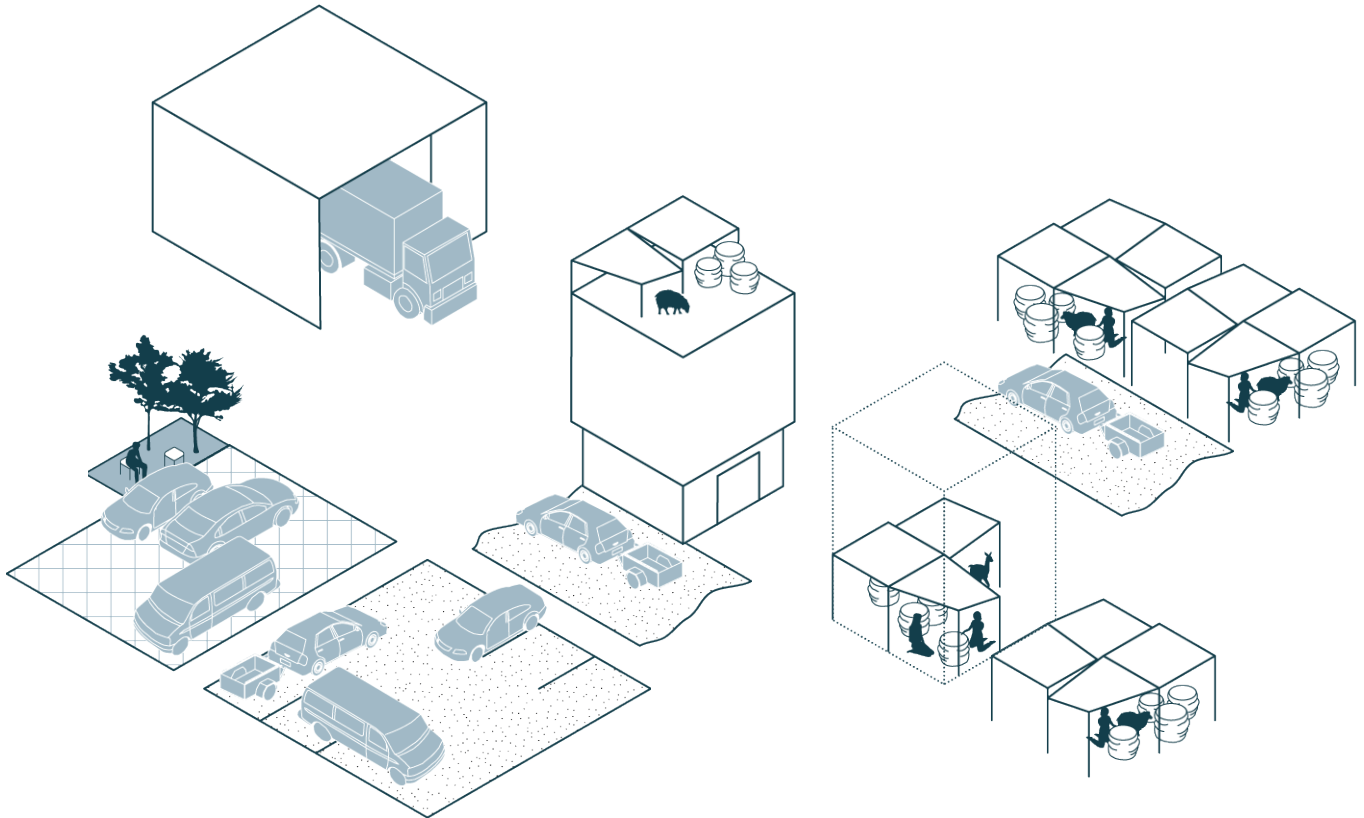
access street

processing facility

house

empty/ sorting lot

shack



ahwa

parking lot

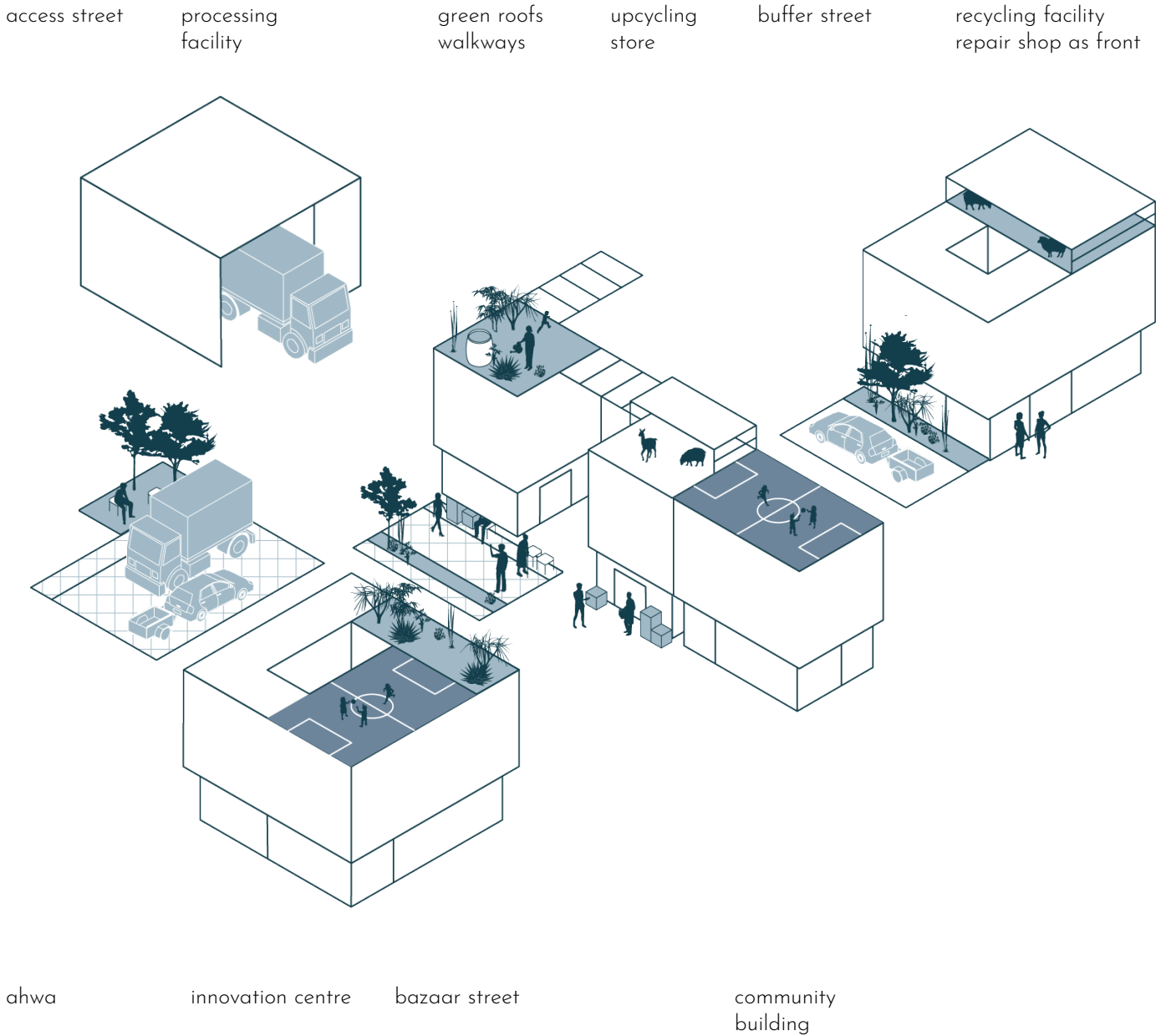
residential
working street

In the current system, most activities in the area involve sorting, such as parking lots, access via the main street, and sorting on rooftops and in public spaces. Some Zabbaleen families also live in this area.

In the new setup, waste is brought to recycling facilities for cooperative families via the access street. After sorting, hazardous or non-reusable materials—such as aluminium, plastic for remelting, glass, and broken appliances—are taken to a designated industrial area. Low-hazard materials, like paper, textiles, and repairable appliances, stay for cleaning and upcycling.

Repair shops located in the ground floors next to the access street act as a

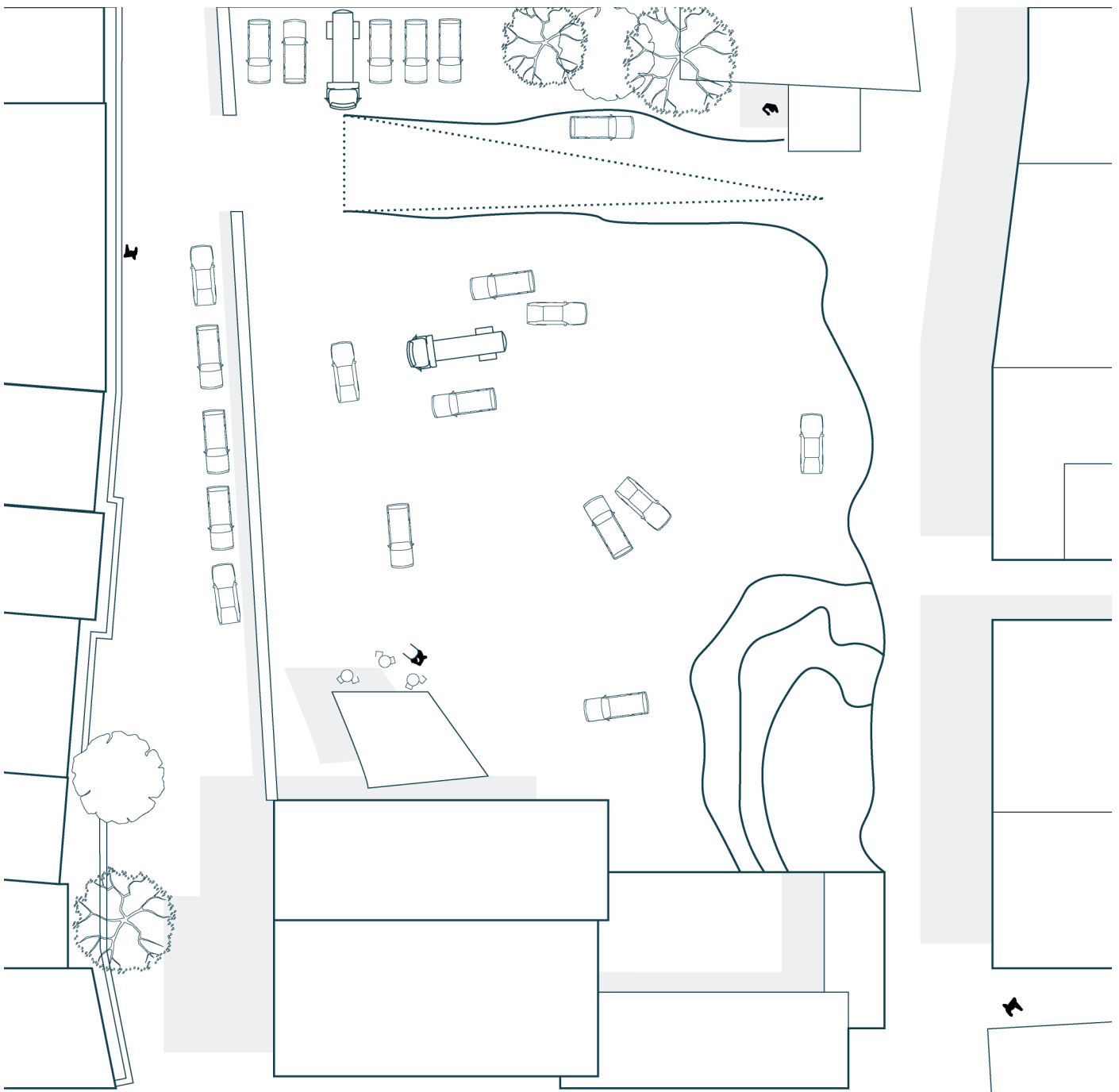
System | Strategy



buffer. Private rooftops are now used for green spaces, while buildings along the street contain upcycling companies and stores. These are situated close to a residential working street, which has been transformed to accommodate slow traffic and pedestrians, creating space for a bazaar and attracting tourists after visiting the pigeon tower.

Parking from the large lot has been redistributed to nearby areas along Moqattam, allowing cars to remain close to workplaces. In the former parking lot, an innovation centre has been established, where residents can gather for coffee, join workshops, send their children to kindergarten, and play on the rooftop.

Site | Current



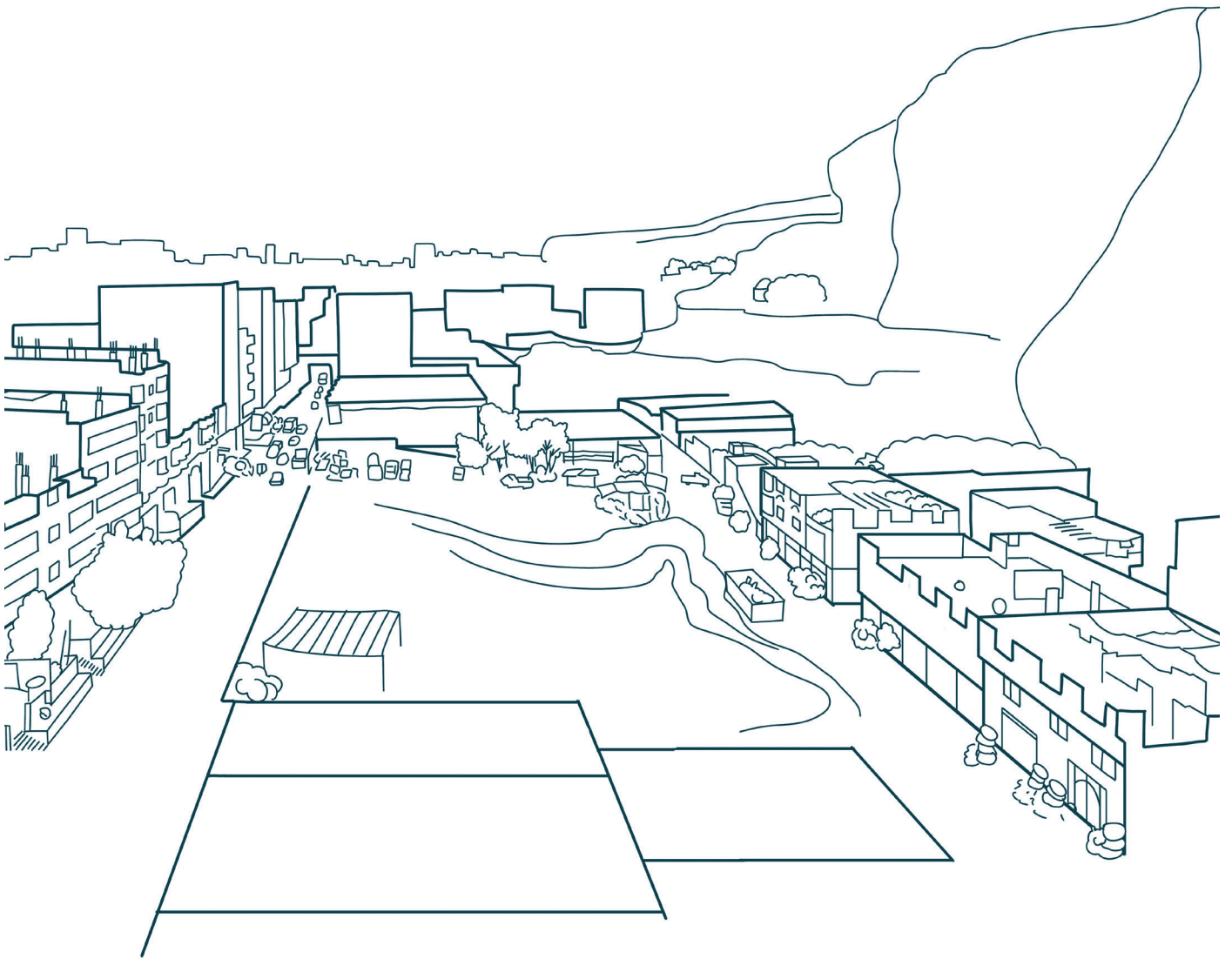
Top view

1:500

0 5 10m



To implement the strategy the current conditions form the basis for change. Access to the sorting shacks is stimulated by improving the road into the area. Zabbaleen working in the shacks close to the Moqattam cliff are approached for collaboration. These pioneers are engaged in group sessions with architects and engineers to identify a suitable plot for a pilot recycling facility. The workers in these lots are given priority to open-up the needed construction site. Additionally, the animals kept on the ground floor level are relocated to the

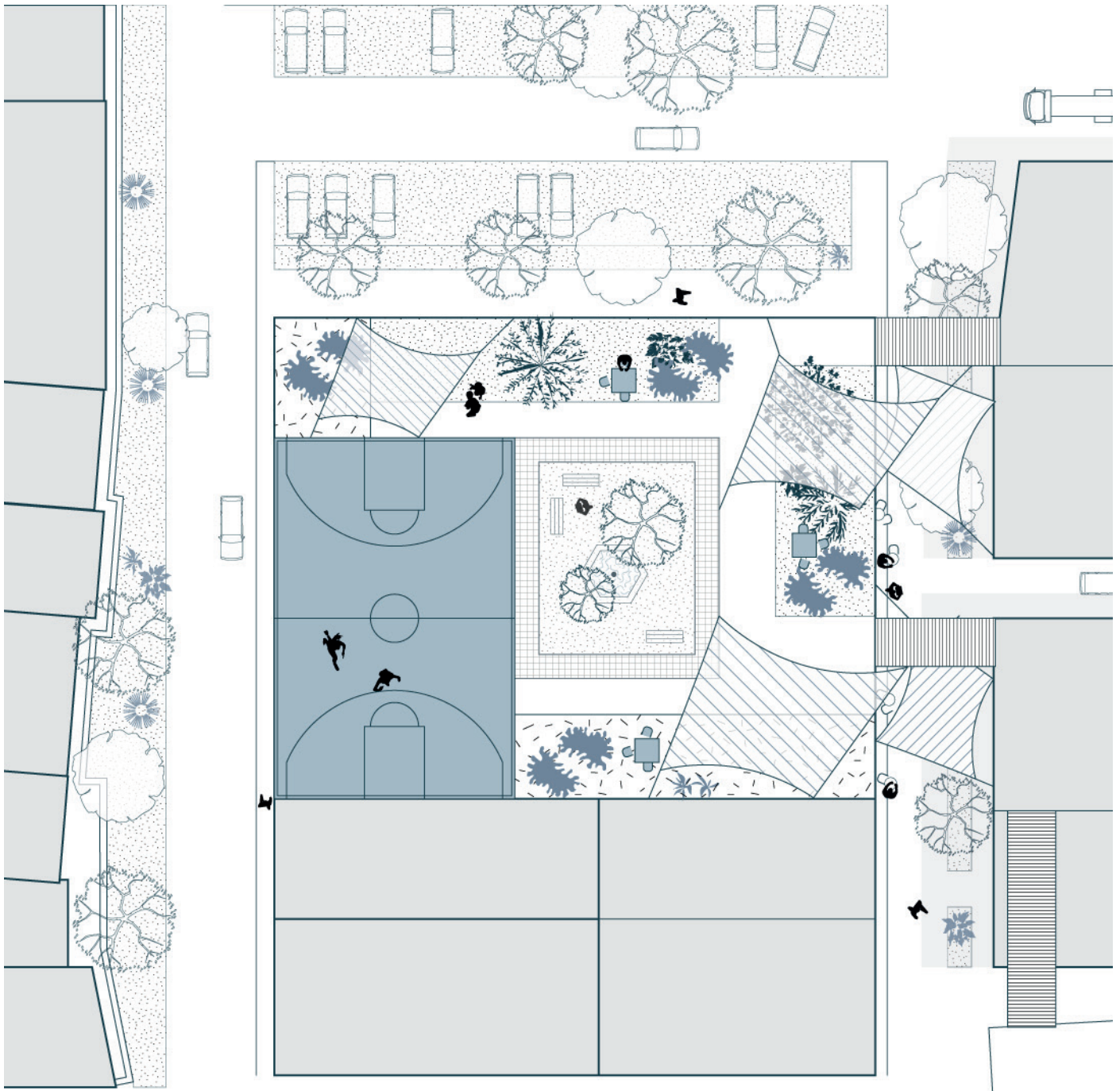


Soft section

rooftops.

To start the transformation of the square a small community centre is set-up there with a nanny, ahwa and an outside playfield with canopies. This gives back to the community, in order to create support for larger scale changes. Additionally trees are planted in the section of the street next to the community centre on the parking lot.

Site | Design



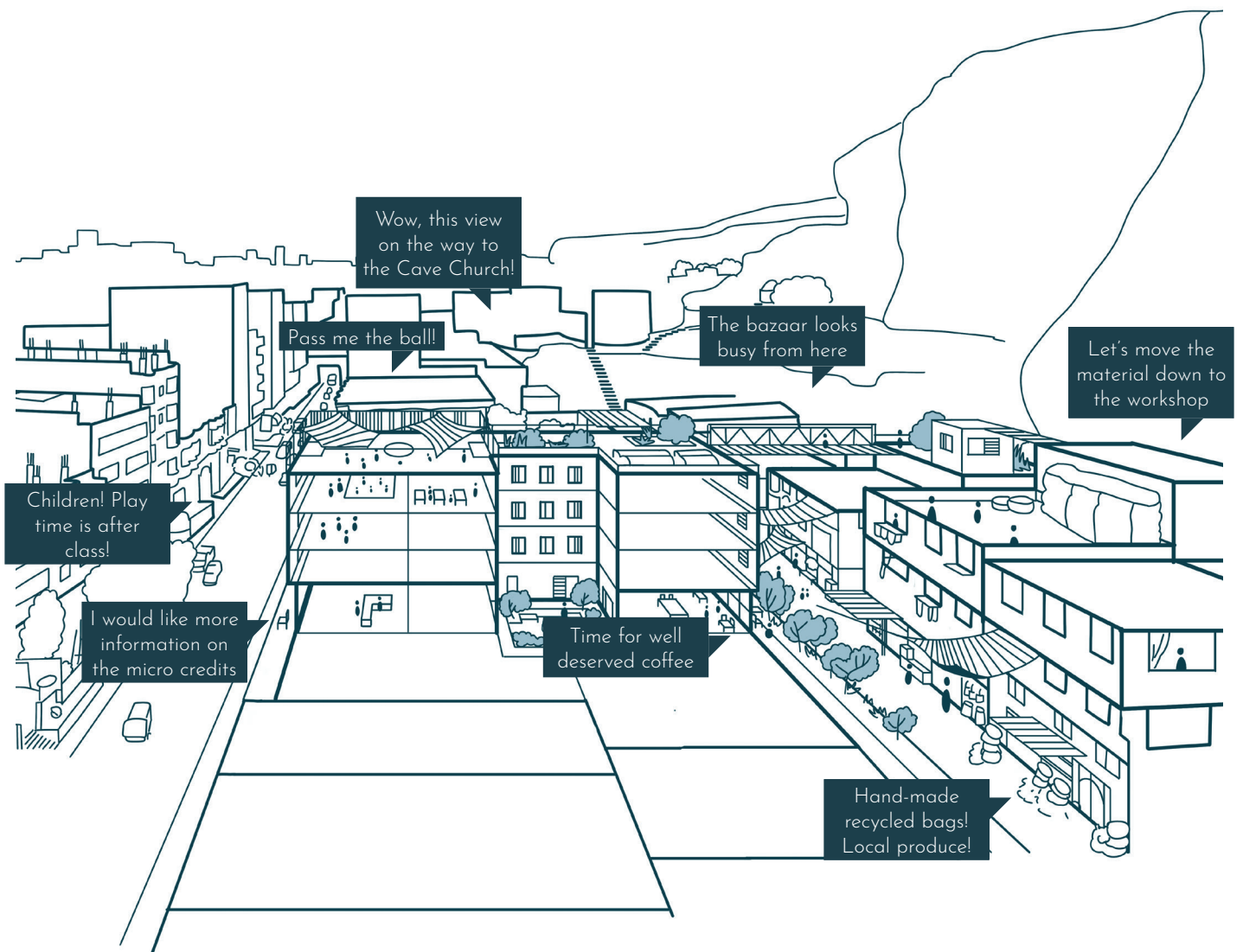
Top view

1:500

0 5 10m



In the new situation, a centre is built in the square with space for parking next to it. The centre is a combination of a community centre, with a nanny and ahwa, and an innovation centre with spaces for workshops on upcycling. These are led by NGOs and volunteering experts from university and the community. On the rooftop a communal garden is built. Since the sorting moved to the recycling facilities, the ground floor in residential buildings are used by upcycling businesses and stores. The street in front is redesigned for slow traffic and



Soft section

pedestrians, making room for a bazaar that now attracts locals and tourists alike. A connection is made from the Citadel to the Cave Church creating a route over the ridge.

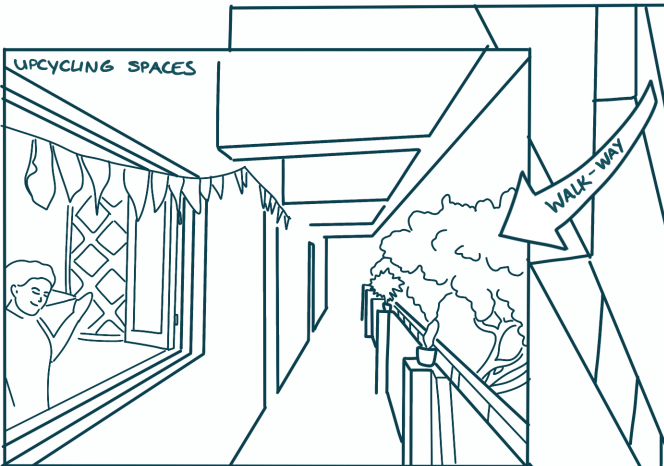
THE MAN COLLECTS THE WASTE AT NIGHT. SOME HOUSEHOLDS HAVE STARTED TO SEPARATE WASTE, SO HE LOADS MULTIPLE BAGS.



HE ARRIVES VIA THE CENTRAL ACCESS ROAD



UPCYCLING SPACES



IN THE RECYCLING ZONE THE FAMILY HAS A CO-OP. THE WOMAN CAN CHANGE AND WASH-UP BEFORE SORTING. HER BROTHER CRUSHES IT INTO CUBES FOR TRANSPORT. UPSTAIRS HER SISTER MAKES DECORATION FROM RE-USABLES.

WALK-WAY

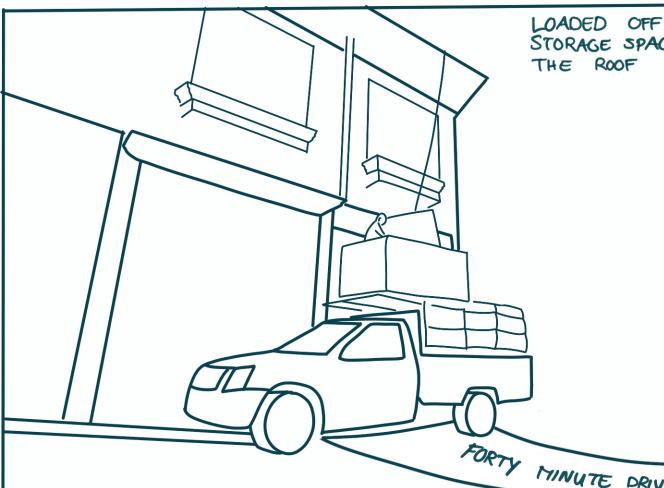
CRUSHED INTO CUBES



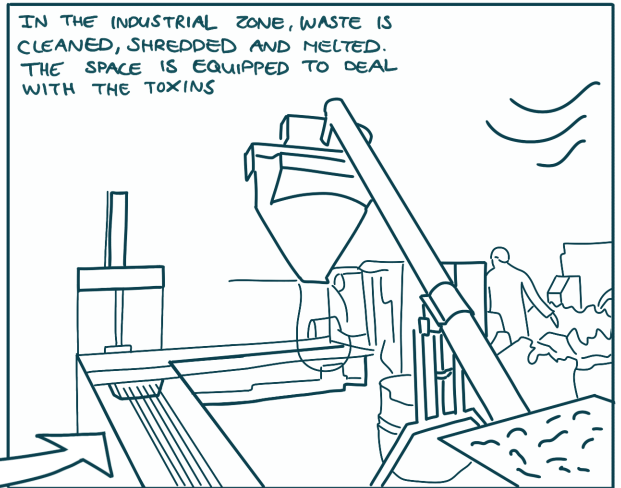
GARAGES



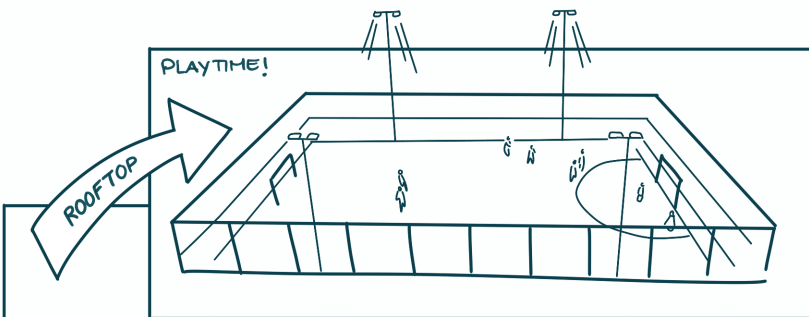
LOADED OFF THE STORAGE SPACE ON THE ROOF



IN THE INDUSTRIAL ZONE, WASTE IS CLEANED, SHREDDED AND MELTED. THE SPACE IS EQUIPPED TO DEAL WITH THE TOXINS



FORTY MINUTE DRIVE



CLOSE TO THE BAZAAR IS THE INNOVATION & COMMUNITY CENTRE, WHERE THE DAD ENJOYS HIS COFFEE AND WHERE THEIR DAUGHTER WORKS WITH A SPECIALISATION IN LOCAL PRODUCE



Assessment

Assessment Diagram

The assessment is based on the framework for Equitable Cities by Noll & Bahr (2023). They developed five urban environmental justice categories that raise related concerns and examples of question that should be asked in the planning process related to these categories. The categories are:

- Environmental Health, concerns contaminants and health burdens
- Essential Amenities Access, concerns access to water, food, green spaces and health care
- Transportation, concerns the distribution and the access to affordable transportation
- Housing Opportunities & Displacement, concerns affordable housing
- Equitable development, concerns stakeholder engagement and participatory decision making.

I have established the assessment based on the related concerns and common questions. The structure of the assessment can be seen on the right. Each patterns is rated on a scale from 0 to 3. 0 is the lowest and increases the issue in that category, while 3 is the highest and innovates to address the issue.

	0	1	2	3
Environmental Health (EH)	Causes pollution	Close proximity to pollution	Adapts to pollution and improves conditions	Mitigates pollution and improves health
Essential Amenities access (EA)	Removes amenities	No change in amenities	Improves existing amenities	Adds a new type of amenity
Transportation (T)	Removes roads or public transport access	No change in transportation routes	Improves existing transportation routes	Adds a new connection to roads or public transportation
Housing Opportunities & development (HO)	Removes housing or displaces people	No change in the housing situation	Improves existing housing, makes it more affordable or increases property value	Adds new types of housing or innovates in the property market
Equitable Development (ED)	Forces unwanted decisions upon people	No involvement in the decision making process	Improves equity and takes stakeholder opinions into account	Actively engages stakeholders in the decision making process

Case study assessment

Since each pattern is rated separately, the combination of patterns in a design makes it possible to rate the collective design on addressing issues in all five categories separately.

For the current situation the Environmental Quality Survey done in Mikhaeil Gergis street is used (appendix p. 162). It has an overall score of 40 out of 130, subdivided into 9 out of 30 for buildings, 11 out of 40 for greenery, 13 out of 35 for amenities and 7 out of 25 for traffic.

An overview of the scores of the patterns used in the design can be seen on the right. Overall the patterns related to adapting the urban form mostly address improvements in terms of Environmental Health, varying in the other scores. Acknowledging community mostly addresses Essential Amenities, also contributing to Environmental Health and Equitable Development. Lastly optimising the recycling chain focusses on both, since it addressed the environmental issues caused by pollution and providing an alternative for them in terms of amenities.

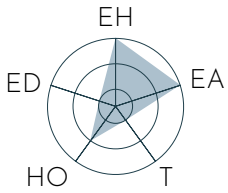
In total the score on the spider diagram of the design is:

- 38 out of 45 for Environmental Health (84%)
- 34 out of 45 for Essential Amenities (76%)
- 18 out of 45 for Transport (40%)
- 20 out of 45 for Housing Opportunities and Displacement (44%)
- 24 out of 45 for Equitable Development (53%)

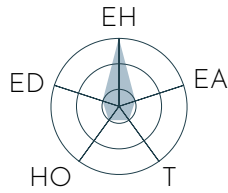
This means that the biggest strength of the intervention in the area lies in mitigating pollution and improving health as well as improving and adding new amenities. In terms of development the opinions of stakeholders are taken into account, but they are not engagement in every part of the process. The lowest scores are for Transport and Housing Opportunities and Displacement. The reason for that is even though roads were improved for work access to create the bazaar, the direct connections via public transport, or over the Moqattam ridge are not located in this area. In terms of housing stock, adjustments are made to improve the living conditions of housing, and increases the property value, people actually need to move within the order in order to execute the zoning of the strategy.

In planning process of these types of developments, it is therefore necessary to communicate and discuss these changes with inhabitants in order to make the transitions equitable and prevention displacement.

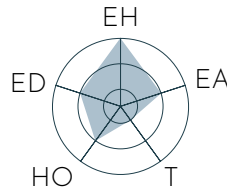
Our rooftop landscape



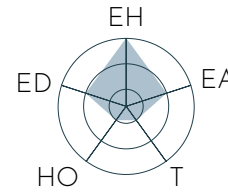
Our Egyptian Plants



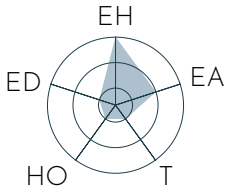
My front garden



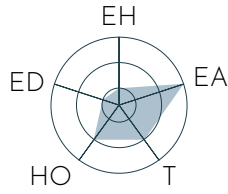
Our versatile canopies



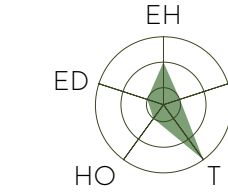
Our ventilated courtyard



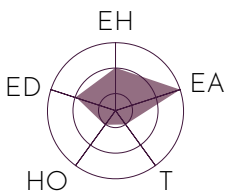
Our walking bridges



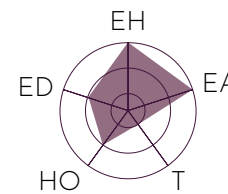
Our road to work



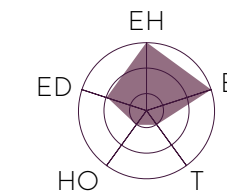
Their outside fun



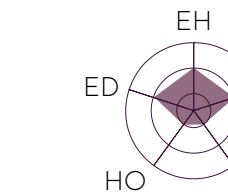
Our private courtyard



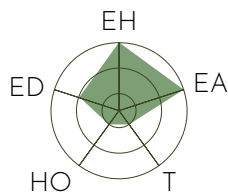
Our neighbourhood nanny



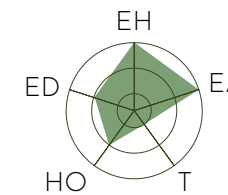
My coffee time



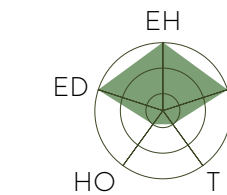
Our hand-made bazaar



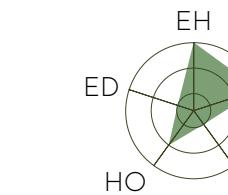
Our up-cycling workshop



Our and their innovation centre



Our neighbourhood farm



Overview of the patterns used in the design

Conclusion

Informal settlements house most of Greater Cairo's population, who face worsening social inequality and vulnerability to climate change due to limited resources and infrastructure. Manshiet Nasser, one such settlement, struggles with environmental hazards and insufficient. The Zabbaleen community plays a crucial role in Cairo's waste management by recycling a the city's waste. The aim of this research was to investigate the Zabbaleen and their work in order to make an urban design that aims that environmental justice for the community: provide a safe, healthy and clean environment for the human and more-than-human actors, where the actors should be the drivers of change. The main research question of this project was: *"How can an urban design achieve environmental justice for Zabbaleen community in the informal settlement of Manshiet Nasser in 2050?"*

In the first part of this project an analysis was conducted to understand how Manshiet Nasser is connected to the broader context of Cairo, how the daily life of the Zabbaleen is shaped by routines and what the perception is of various stakeholders of the community.

SRQ1 In what ways is Manshiet Nasser connected to the broader environmental, infrastructural and socio-economic context of Cairo?

The natural environment around Manshiet Nasser is heavily influenced by the arid desert climate, with sandy and limestone-rich soil that is unsuitable for greenery. The Moqattam mountain also poses significant risks to the area, with threats from rockfalls and landslides due to water seepage and construction of buildings. Implementing native plants and soil treatments could help create green structures that are more resilient to these conditions.

Although Manshiet Nasser lies on the urban periphery of Cairo, separated by cemeteries and highways, its location in the has improved due Cairo's urban expansion. Over time, the area has developed relatively high-quality buildings, which have similarity to Islamic Cairo and use vernacular methods to respond to the heat. However, this informality also brings challenges, particularly with limited accessibility. Some facilities and amenities have been introduced as well, though they remain limited in number and quality.

SRQ2 What are the routines that shape the daily life of the Zabbaleen community?

The Zabbaleen community earns its livelihood from recycling, playing an essential role in Cairo's waste management system. Families share responsibilities in various roles, bringing their work home. Men collect the trash with their trucks at night and women sort during the day. There is a variety of companies active in the area, from sorting, to specialisations in processing all types of waste. During this process inhabitants are exposed to hazards, such as fumes from the melting of plastic and metals. A.P.E. a local works on upcycling products, from paper and textiles, providing alternative jobs. On the downside, this type of work is not available for all families, requiring skill development , investments and a sales market. Despite these challenges, the Zabbaleen envision a better

future for their children, stimulating education opportunities and developing industrial areas outside of the area.

SRQ3 How do various stakeholders perceive the living and working conditions of the Zabbaleen community?

The stakeholders have diverse perception of the problems within Zarayb. Overall most stakeholders agree that the challenge of the Zabbaleen lies in the environmental conditions of the neighbourhood, but the response to this issue differs.

Inhabitants are aware of the health hazards, but are required to overlook them to have an income. In order to strengthen their position in the housing and work market, the Zabbaleen have united in firms and unions. The different positions of power that are created within this system lead to conflict of interest on the local scale.

NGOs recognise the environmental and economic challenges and prioritise upgrading initiatives and community programs. However, they understand that structural change is necessary, rather than merely mitigating.

Manshiet Nasser has a long history of government intervention that disregards local needs and initiatives. The government sees relocation and new developments as the main solution and directs energy to the construction of public housing. Top-down urban upgrades have focused on physical infrastructure over social needs, often neglecting the importance of the Zabbaleen's work in waste management. Instead of recognising the Zabbaleen's contributions, the government has attempted to remove them from the system, threatening their livelihoods without providing viable alternatives.



Network



People & Everyday Life



Governance

In the second part of this project a design for Zarayb was explored as a response to the chances and challenges found in the analysis. The analysis was translated into a vision and a set of design goals: 1. Adapting the Urban Fabric; 2. Acknowledging the Community; and 3. Optimising the recycling chain.

SRQ4 How can a pattern language support the urban design in the Zabbaleen community?

The use of a pattern language makes it possible to provide an array of possible interventions in Zarayb. These interventions in the form of patterns, connect theory from literature reviews and fieldwork observation to design for environmental justice in informality. The patterns in this pattern language are related to one or more of the approaches of participatory, context-based and vernacular design. Since all these patterns are related, they form a language that can be used by designers as well as other stakeholders. By designing the patterns in the form of a card, it is possible to use it as a communication tool in the collaborative formation of a design. Depending on the goal the patterns can be reshuffled by designers, inhabitants or other users to create new sets.

In this case the pattern language was used as a bridge between the findings from the analysis and the literature review to create sets of interventions that addressed the set design goals. The relation between the patterns and the location of the patterns in Zarayb made it possible to create a bigger strategy. The urban design was one case within this strategy.

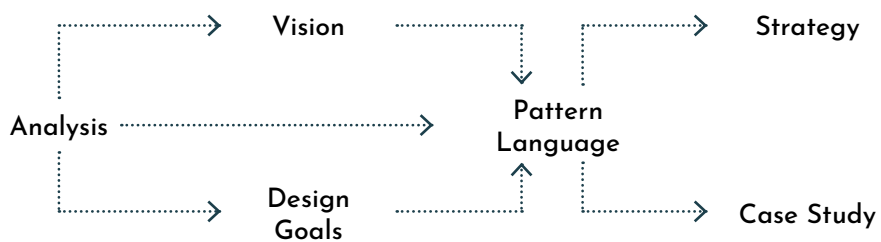
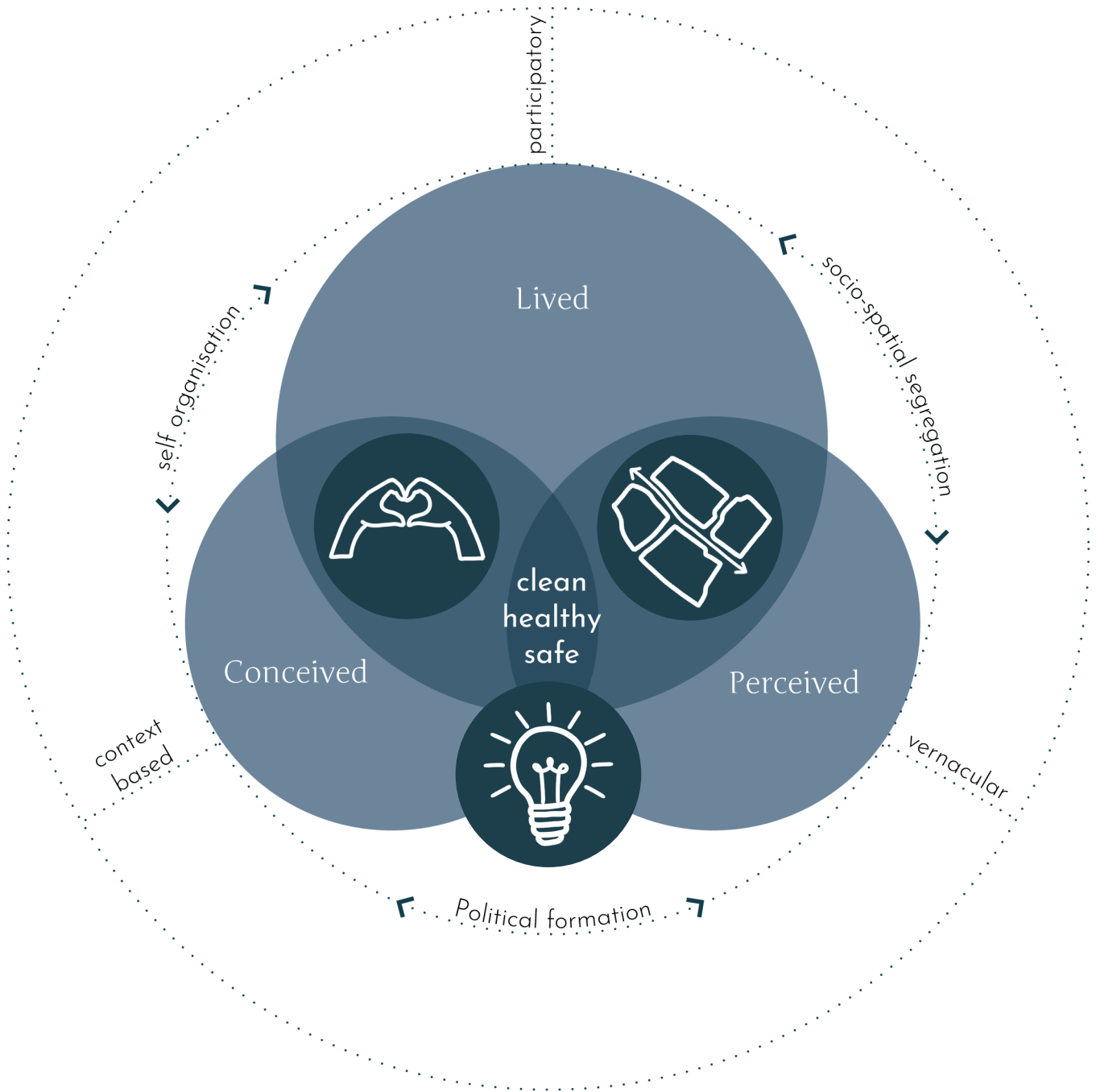
SRQ5 To what extent is the urban design appropriate and feasible?

The urban design should provide a safe, healthy and clean environment for the human and more-than-human actors, while recognizing these communities as agents of change. The design changed the current system to cool down the urban environment, to provide space for community development, to diversify waste business opportunities while reducing health hazards.

To create support for the design stakeholders needs to be involved in the process to translate wishes into interventions and to negotiate conflicting interests. Financing has to come in the first place from top-down, the civic and private sector can invest in changes and developments on the small scale, after which the public sector is the main financier for large scale projects in the city.

Overall the achievement of Environmental Justice in a design is difficult to measure. It consists of many factors that require not only physical upgrading, but also mindset changes. It requires the extensive knowledge of the context and the development trends that have led to current conditions. Especially important is to make informal processes explicit and to involve community members in the design process. Trade-offs are part of the development process. Possible interventions need to be clear to all stakeholders for these to take place. Trade-offs are related to conflict of interest between stakeholders and in spatial claims between interventions.

In the end this project is meant to inspire designers and policy makers by showing an alternative future development and to spark conversation on how this win-win could be achieved.



Discussion

In this discussion, some limitations and challenges of the project are discussed.

Site Visit

The site visit impacted the findings on people, daily life, functioning of the recycling system and the urban environment. In the first place, the site visit took place with the presence of a guide due to safety concerns. The guide was a local who spoke limited English, which makes it possible some conversations were lost in translation. Additionally, locals and the guide have their own values and perspective, which makes it possible that opinions impacted the nuances in translation. Secondly, my contact person for finding a guide and explaining the purpose of the workshop, did not prepare and discuss my site visit beforehand. Therefore, my guide was found last-minute and was not informed of the workshop. My lack of Arabic made it difficult to explain and inhabitants were not available to join. Thus it was substituted with informal interviews with people that were available, mostly teachers and employees of an NGO, not the sorters themselves. Thirdly, inhabitants prefer to keep opinions off the record, and also in a more formal interview setting people prefer not to see any official papers. Consequently, findings from conversations were not recorded and anonymous, written down in bullet points and elaborated at the end of the day. Lastly, the Environmental Quality Survey that I prepared beforehand lacked topics that I did note in my observations, therefore the EQS was elaborated and updated after my return using photos from the fieldwork as well.

These findings were complemented by academic sources from respectively Tad-amun Initiative (2020) and Fahmi & Sutton (2010) and journalistic depictions in videos (RT TV-NOVOSTI, 2016; VRT 1, 2022). However, the complexity of the local informal organisation makes it difficult to expose all processes.

Gentrification

Gentrification is the development of a neighbourhood by investments from wealthier people, possibly leading to the displacement of the current inhabitants (Ahmad, 2021). Gentrification does not develop everywhere the same, it has many different aspects social, cultural, economic and political. Those aspects define the process of gentrification and how it develops in urban neighbourhoods (Ahmed, 2021). This could be a possible future for Manshiet Nasser: while the environment might improve with safer living conditions and better access to basic necessities, these changes could also attract people from wealthier, nicer parts of Cairo.

Many inhabitants of Manshiet Nasser have built and own the houses they live in, but their ownership is not officially recognised. This lack of recognition leaves them vulnerable to developers who may disregard their tenure rights, demolish their homes, and construct new buildings in their place. To prevent this, ownership must be formally acknowledged before the neighbourhood becomes too attractive. NGOs, designers, and residents should hold off on implementing major structural changes until these rights are guaranteed.

Interestingly, Manshiet Nasser is already diverse in terms of income. It is not only an area for the poor; middle-income residents choose to stay for the

affordable housing (ownership), and some wealthy families enjoy status within the community. However, the most threatening developments are those that make the neighbourhood increasingly appealing for middle- and upper-income groups to remain and invest. Young adults climbing the income and social ladder usually choose to move elsewhere. If they stayed and occupied housing that other families need, the most vulnerable residents would be at risk. The poor would struggle to afford housing elsewhere and satellite towns are located far away from work.

To protect the poorest Zabbaleen, it is essential to guarantee them housing and workspace while involving them in the redevelopment process. By negotiating spaces for living and working and including them in work innovation initiatives, their incomes could become more stable or even increase, enabling them to achieve greater self-sufficiency as the value of the neighbourhood rises.

Some patterns in this project already focus on the participation aspect and the involvement of the community in the development process, such as "My collective design" and "My lantern pole". They stimulate the community to raise their voice. Indirectly participation already is a mechanism to prevent gentrification as it prioritises their needs in the decision making process.

Policies

Support, financing, and maintenance in the form of policy structures need further exploration. The planning process and design proposal presented are not definitive; they are based on one year of analysis and research conducted by a single individual, with only one dedicated site visit. My thesis did not include a policy analysis or discussions with officials about the formal structures for financing these types of changes.

The key findings focus on mediating conflicting stakeholder interests and spatial claims arising from potential interventions. To address these conflicts, it would be wise to create zoning plans that allocate space for developments and interventions. These plans should not only consider developers but also actively involve local organisations and residents. Policies should prioritise bottom-up approaches, taking local organisational structures into account.

Many patterns in the proposed pattern language are rooted in informality, reflecting observations of housing and work practices established by the community outside formal regulations. The challenge lies in protecting these informal processes from being replaced by top-down formal systems. The solution may lie in institutionalising informal practices and integrating them into formal systems where possible. However, some processes may not meet health or safety standards, requiring compromises. By recognising and integrating informal practices, we can also protect them.

Reflection

What is the relation between your graduation project topic, the studio topic, your master track, and your master programme?

The graduation project addresses an informal settlement in Cairo. This issue is the result of a complex web of societal and urban factors, such as population increase and ineffective governance, which create a situation where inhabitants face socio-spatial segregation in an urban environment unprepared for climate change. This topic strongly relates to the Planning Complex Cities studio, which addresses disparities within communities and territories caused by the unequal distribution of spatial resources. The graduation project tackles this issue by conducting analysis across multiple scales, taking both spatial and institutional challenges into account. This fits within the larger scope of the MSc AUBS and the Urbanism track. The project aligns, firstly, by designing for sustainable development that considers both local and global trends, such as climate change, and secondly, by applying multiple perspectives and drawing on fields related to urbanism, including physical and social sciences. The graduation topic addresses not only human needs but also considers the needs of the environment, acknowledging the natural and human-made conditions of the site and recognising that these need to work together to move towards a more sustainable, liveable, and manageable urban environment.

What is the relation between research and design in your graduation project?

Research played a crucial role in creating a theoretical framework, which helped me position myself as a researcher while also forming an understanding of the project's context. Since my graduation project is situated in another country with a history and traditions very different from my own, I needed to do extensive research to understand the context. This research ranged from a larger-scale understanding of the city of Cairo and the political system of Egypt to the complex relationships between civil society and the government. Much of my initial research before P2 focussed on mapping and analysing spatial and social structures, but also on building an image and immersing myself in the culture. Visiting Cairo, looking around in the city, talking to people without an agenda especially, opened me up to a different way of thinking and a different value set than what I was used to in the Western world. This early research helped generate design ideas and ideas on a potential future scenario, sometimes without my realisation as it was happening subconsciously. Especially after P2 and moving towards P3, it became clearer that my exploration of ideas and spaces would lay the foundation for my design. Observations from literature reviews and fieldwork were translated into a pattern language that helped me connect, but also distinguish, research findings from practical implications.

How do you assess the value of your way of working (your approach, your used methods, used methodology)?

My approach was quite open-minded. I started with a very broad exploration of my topic, eventually narrowing down to the most essential parts. This ap-

proach had both pros and cons. On the upside, it allowed me to understand the system's complexity, see underlying connections, and learn without making judgements, so my academic position was shaped by the process rather than by preconceived ideas. However, a downside was that I spent time exploring topics that proved irrelevant in the end or lacked the focus they needed. If I had been able to be more selective in the beginning and especially trimmed down the scope of my sub-questions, I could have explored the design more thoroughly and developed more variations. I do think this is a common challenge in international projects, outside the culture and context of the researchers, since it is necessary to understand that first, before being able to effectively address it.

I believe the pattern language was useful in translating the complexity of the system and my findings in literature to interventions. I do wish I would have started this earlier. It would have helped to make my findings more explicit and translate into tools and products that I could have developed further along the way. Additionally, I believe spatialising the patterns was an important part of unveiling the possibilities for a strategy of which the design would be a part. It did make the process longer and more complex, since I was trying to develop a strategy on the scale of Manshiet Nasser, before starting to implement the patterns on the smaller scale. When I look back on it, I would have preferred to start designing on the smaller scale first, testing out the patterns, and using this thought process to develop the larger scale lines. In the end I feel that the details of the strategy, phasing and the design could have been elaborated



Proud owner showed me his pigeons on the pigeon tower



A girl asked to take a picture together

more, if I would have focussed more and worked less simultaneously. On the other hand this process of working simultaneously allowed me to understand the system better, which is very complex.

For me it was also very important to make my project participatory and reflect the voices of the inhabitants in the design. I would have liked to have done this more in depth, especially considering the collaborative workshop did not take place during my site visit. The limits due to time, language and difference in culture is something I would take into consideration for my next project. Especially staying longer and taking an extra person that speak the language with me on my visit.

How do you assess the academic and societal value, scope and implication of your graduation project, including ethical aspects?

- Academic and societal value: Academically, a lot has been published on informal settlements and the Zabbaleen community before my thesis. Where I believe my thesis adds value is in recognising the strengths of this community, not only in social terms but also in their recycling work. We are in a time where a shift towards more local production and an awareness of our (waste) footprint is growing. This project shows how human and environmental well-being could coexist within a business that benefits both finances and limited resources. Socially, it highlights the strengths of informal communities, showing how we can learn from them for our formal communities. This thesis aims to reduce the stigma attached to the garage collectors by reframing their work as something deserving of societal recognition and respect.
- Scope: My project focuses on Cairo and the specific context of Egypt. A contribution could be made to the field of informal settlements by providing more scientific support for practitioners in this area.
- Ethical aspects: Ethically, this project was challenging because it addresses a marginalised community living in an informal settlement. However, the government is aware of these people's presence, partially recognising and partially ignoring the community. Significant amounts of research, documentaries, and photographs already reveal who these people are and how they live and work in Zarayb. I took care to anonymise the feedback and opinions of residents about the government and various community stakeholders, as expressing certain views could create a risk of backlash. On the other hand, there are public housing neighbourhoods in Manshiet Nasser that were built with specific governmental intentions for appearance and function. The exposure of "illegal" activities, such as ground-floor expansions, sparked fear within the local community. This shows the conflicts that arises in the academic field when researching and designing for informal settlements. A valuable intervention is based on the context, processes and people, which need to be made explicit to be understood. However, there is power in knowledge, which can change the direction of a project depending on who is in control.

How do you assess the value of the transferability of your project results?

The goal in designing for informal settlements is to create solutions that are specific to their context, not transferable to other sites. However, researchers and designers can learn from the method and process, recognising context-specific analysis and stakeholder engagement as tools for creating site-specific interventions. Especially important is the understanding that political and financial backing are essential for project feasibility, and this can be achieved through changes in mindset and understanding internal motivations. The transferability of the pattern language to other informal settlements with different socio-cultural contexts or environmental conditions depends on the specific patterns.

Patterns related to the environment, such as addressing climate change and learning from vernacular design, are highly replicable and relevant in countries dealing with arid climates, rising temperatures, and high-density urban areas impacted by climate change. These patterns highlight the importance of drawing inspiration from traditional architectural and urban design and adapting these concepts to modern contexts. Instead of adopting a globalised, modernised building style that disregards climatic and cultural contexts, it is far more valuable to design in ways that respond to local environmental conditions.

The same principle applies to actions focused on community development. Informal settlements are not unique to Egypt; they exist worldwide. The struggle of residents to have their communities recognised and their needs respected can inspire actions that support similar development efforts. In the end, cities benefit from these changes, as they improve public perception and enable current and future generations to contribute to economic and social progress. While some patterns are site-specific—for example, not every place values *ahwas*—these examples can serve as inspiration to translate community needs into spaces of expression.

Recycling-related actions are also context-specific, shaped by the unique systems created by the Zabbaleen community. However, there is much to learn from their recycling processes. By examining similar systems in other regions, such as garbage collectors in Latin America or Africa, we can identify applicable patterns. The key lies in localising recycling and waste processing, bringing these activities closer to home—within cities—rather than continuing the unsustainable practice of exporting waste to create “wastescapes” in other countries.

If you could continue working on the project what would your next actions be?

If I were to restart the process of my thesis, I would follow the same approach, using the knowledge I have gained through analysis, research, and design to further refine and expand upon the work I have already done.

One of the challenges of finishing a project is the realisation that you could now complete it more quickly and efficiently, thanks to everything you’ve learned along the way. There is also the frustration of recognising gaps and missing elements that only became clear as your understanding deepened. I would use this knowledge to fine-tune and elaborate on the work, building upon the foundation I’ve already established.

Designing is an iterative process and by going back and forth between analysis and design the project can improve every time.

What was your most challenging personal conflict as a researcher and designer during this project?

I think that our role as designers is to be aware of changes that need to happen and to use design as a way to imagine a future that is desirable for all. When I first started my process I immersed myself wholly, which made me care for Egypt and community in Manshiet Nasser. However, as the process continued, I had to remember that an urbanist is not a facilitator, it is about protecting what is desirable in the urban environment. I got told during my site visit by someone long involved in the area: "In the end you have to ask yourself if you want to live here with your children". This question made it clear that while I have to respect the community and the environment they have created, it is equally important to address the limits of expansion, density, and the significant health hazards of living there. The Zabbaleen do such important work, so they cannot be taken out of the equation, but improvements have to be made to the urban environment. Unfortunately that does require a sacrifice from the community to some extent. It is not tenable to keep sorting waste in the garage above which you are living, nor is it justifiable to inhale toxic fumes your whole life while doing your work. The solution in Western countries may be an alternative to health hazards, but it is not an alternative to efficiency in terms of the little waste recycled, while also dumping enormous amounts of waste on other continents. A middle ground has to be found for dealing with waste closer polluters. The Zabbaleen have shown that money can be made in the recycling business. The task ahead is to make this an attractive business model: instead of seeing one after the other (Dutch) recycling company go broke, the business should be a logical alternative to producing new waste without an end.

Abdelaal, A., Awatta, H., Nagati, O., Salman, S., & Shykhon, M. (2021). Centralised Urban Governance in the Greater Cairo City Region: A critical understanding of key challenges and responses. In *Refractions of the National, the Popular and the Global in African Cities*. African Minds. <https://library.oapen.org/bitstream/handle/20.500.12657/51122/1/9781928502159.pdf#page=48>

Adulyatham, P. (2022). Gallery of Cairo Architecture City Guide: Exploring the Unique Architectural Blend of Historical and Contemporary in Egypt's Bustling Capital [Graphic]. <https://www.archdaily.com/1003344/cairo-architecture-city-guide-exploring-the-unique-architectural-blend-of-historical-and-contemporary-in-egypts-bustling-capital/64a2cdaecb9c464fa63a9764-cairo-architecture-city-guide-exploring-the-unique-architectural-blend-of-historical-and-contemporary-in-egypts-bustling-capital-image>

Aga Khan Trust for Culture. (2007). Manshiet Nasser Participatory Urban Development. Archnet. https://www.archnet.org/sites/6100?media_content_id=53881

Ahmad, M. S. E. (2021). Introducing a New Methodology to Deal with Gentrification in Urban Neighborhoods: Case study of Fatimid Cairo and Heliopolis. <https://doi.org/10.5445/IR/1000129253>

Alexander, C. (1977). *A pattern language: Towns, buildings, construction* (S. Ishikawa & M. Silverstein, Eds.). Oxford University Press.

Al-Mailam, M., Arkeh, J., Hamzawy, A., & Peace, C. E. for I. (2023). Climate change in Egypt: Opportunities and obstacles. Carnegie Endowment for International Peace. https://carnegieendowment.org/files/Al-Mailam_et_al_Egypt_Climate_2.pdf

Almatarneh, R. T. (2013). Choices and changes in the housing market and community preferences: Reasons for the emergence of gated communities in Egypt: A case study of the Greater Cairo Region, Egypt. *Ain Shams Engineering Journal*, 4(3), Article 3. <https://doi.org/10.1016/j.asej.2012.11.003>

Aly, D., & Dimitrijevic, B. (2022). Public green space quantity and distribution in Cairo, Egypt. *Journal of Engineering and Applied Science*, 69(1), 15. <https://doi.org/10.1186/s44147-021-00067-z>

Amer, W. M. (2018). Biodiversity in Egypt. In *Global Biodiversity Volume 3 Selected Countries in Africa*. Apple Academic Press.

Architectenweb. (2021). Egyptische regering begint met verhuizing naar nieuwe hoofdstad [Graphic]. <https://architectenweb.nl/n51049>

Bakhaty, A., Salama, A. M., & Dimitrijević, B. (2023). A Validated Framework for Characterising Informal Settlements: Two Cases from Greater Cairo, Egypt. *Buildings (Basel)*, 13(5), 1263. <https://doi.org/10.3390/buildings13051263>

Bechmann, C. (2023). Urban Nature in Daily Doses. <https://repository.tudelft.nl/record/uuid:699b920b-e20d-4359-8120-7185036610ed>

Bianca, S. (2000). Urban form in the Arab world: Past and present. vdf. <https://www.archnet.org/publications/10765>

Blue Cairo. (2021). Essential Map for Exploring Islamic Cairo [Graphic]. <https://sacredfootsteps.com/2021/02/04/essential-map-exploring-islamic-cairo/>

Brinkhoff, T. (2023). Munsha'āt Nā r–Population Statistics, Charts, Map and Location. Citypopulation.De. https://www.citypopulation.de/en/egypt/greater-cairo/0113_-_munsha%C4%81t_n%C4%81%E1%B9%A3r/

Cassel, M. (2015). Turn waste into wealth–Zabaleen community's garbage city [Graphic]. <https://architectureindevelopment.org/news/113>

Cousin, E. (2023, January 19). Torenhogge inflatie, lege schappen: Komt Egypte nog uit de economische crisis? NRC. <https://www.nrc.nl/nieuws/2023/01/19/torenhogge-inflatie-lege-schappen-komt-egypte-nog-uit-de-economische-crisis-a4154767>

Davies, P. (2024). Eight Archaeological Sites in Al Darb Al Ahmar Area to Be Restored [Graphic]. <https://scenenow.com/artsandculture/eight-archaeological-sites-in-al-darb-al-ahmar-area-to-be-restored>

Degner, D. (2017). A major traffic interchange in central Cairo, Abd El-Moneim Riad... [Graphic]. <https://www.gettyimages.co.uk/detail/news-photo/major-traffic-interchange-in-central-cairo-abd-el-moneim-news-photo/861587240>

Dench, P. (2019). The Zabbaleen: The "Garbage People of Cairo" [Graphic]. <https://discoverdiscomfort.com/cairo-zabbaleen-garbage-collection/>

Desouki, K. (2008, October 29). An Egyptian worker leads a donkey cart with huge sacks of garbage at... Getty Images. <https://www.gettyimages.nl/detail/nieuwsfoto%27s/an-egyptian-worker-leads-a-donkey-cart-with-huge-sacks-of-nieuwsfotos/83476170>

Desouki, K. (2023). The Great Pyramid of Khufu [Graphic]. <https://www.washingtonpost.com/opinions/2023/08/01/cairo-gardens-disappearing-development-military/>

Egypt Today. (2024, September 25). Urban Development Fund: Reshaping Egypt's Urban Landscape for a Better Future. EgyptToday. <https://www.egypt-today.com/Article/3/134998/Urban-Development-Fund-Reshaping-Egypt's-Urban-Landscape-for-a-Better>

El Rashidi, Y. (2023, August 1). See the heartbreaking destruction of Cairo's iconic gardens. Washington Post. <https://www.washingtonpost.com/opin->

ions/2023/08/01/cairo-gardens-disappearing-development-military/

El-Amier, Y., & Abdulkader, O. (2015). Vegetation and Species Diversity in the Northern Sector of Eastern Desert, Egypt. *West African Journal of Applied Ecology*, 23, 75-95.

Elcheikh, Z. (n.d.). Traffic and Transport Challenges in Cairo | Smart Cities Dive. Traffic and Transport Challenges in Cairo. Retrieved 4 November 2024, from <https://www.smartcitiesdive.com/ex/sustainablecitiescollective/traffic-and-transport-challenges-cairo-egypt/146751/>

El-Ghani, M. A., Bornkamm, R., El-Sawaf, N., & Turkey, H. (2011). Plant species distribution and spatial habitat heterogeneity in the landscape of urbanizing desert ecosystems in Egypt. *Urban Ecosystems*, 14(4), 585-616. <https://doi.org/10.1007/s11252-011-0188-1>

Elgohary, M. M., Abdin, A. R., & Khalil, H. A. E. (2024). Upgrading informal areas through sustainable urban development principles. *Journal of Engineering and Applied Science*, 71(1), 65. <https://doi.org/10.1186/s44147-024-00367-0>

Elmouelhi, H. (2019). New Administrative Capital in Cairo: Power, Urban Development vs. Social Injustice - an Egyptian Model of Neoliberalism. In *Neoliberal Urbanisierung* (pp. 215-254). <https://doi.org/10.14361/9783839437803-007>

Elshahed, M. (2015, March 23). Nasr City was once Egypt's new capital, but things went wrong. *Cairoobserver.Com*. <https://cairoobserver.com/post/114391196879/nasr-city-was-once-egypts-new-capital-but-things>

El-Shahed, M. (2023). Partially cut-off trees in Heliopolis in January 2020 [Graphic]. <https://www.washingtonpost.com/opinions/2023/08/01/cairo-gardens-disappearing-development-military/>

Elshamy, M. (2015). Turn waste into wealth—Zabaleen community's garbage city [Graphic]. <https://architectureindevelopment.org/news/113>

EROS. (2023). Urban growth. <https://eros.usgs.gov/earthshots/urban-growth-1>
European Investment Bank. (2016, March 5). Modernising the Cairo metro. European Investment Bank. <https://www.eib.org/en/projects/all/20100613>

Fahmi, W. S., & Sutton, K. (2010). Cairo's contested garbage: Sustainable solid waste management and the Zabaleen's right to the city. *Sustainability*, 2(6), 1765-1783. <https://doi.org/10.3390/su2061765>

Fiqi, K. E. (2008, September 6). Official: Egypt rock slide death toll rises to 31. <https://www.nbcnews.com/id/wbna26573778>

FSC. (n.d.). Fieldwork for Inner Cities. Field Studies Council. Retrieved 28 No-

vember 2024, from <https://www.field-studies-council.org/resources/14-16-geography/urban/inner-cities/fieldwork/>

Gerlach, J. (2009). Problems to Face. In *Cairo's Informal Areas Between Urban Challenges and Hidden Potentials* (pp. 74-79). Norprint SA. https://www.citiesalliance.org/sites/default/files/2019-07/CairosInformalAreas_fulltext.pdf

Ghodbane, D. (2023). Hot houses: Cairo's climate. In CNRS Éditions eBooks. <https://doi.org/10.4000/books.editions-cnrs.58460>

Hassan, A., Lee, H., & Yoo, U. (2015). From medieval Cairo to modern Masdar City: Lessons learned through a comparative study. *Architectural Science Review*, 59, 1-14. <https://doi.org/10.1080/00038628.2015.1015947>

Hassan, H. M., Fasan, M., Sayed, M. A., Romanelli, F., ElGabry, M. N., Vaccari, F., & Hamed, A. (2020). Site-specific ground motion modeling for a historical Cairo site as a step towards computation of seismic input at cultural heritage sites. *Engineering Geology*, 268, 105524. <https://doi.org/10.1016/j.eng-geo.2020.105524>

Hendley, P. (1986). *The World is Beautiful: Two Years on the Road* (Photos) [Photo].

Hereher, M., Eissa, R., Alqasemi, A., & El Kenawy, A. M. (2022). Assessment of air pollution at Greater Cairo in relation to the spatial variability of surface urban heat island. *Environmental Science and Pollution Research*, 29(15), 21412-21425. <https://doi.org/10.1007/s11356-021-17383-9>

Kenawy, A. (2016). Al-ashwaiat areas in Greater Cairo Region (GCR) a Challenge for the state. ResearchGate. <https://doi.org/10.13140/RG.2.2.24175.79524>

Khalil, H. A. E. E., Ibrahim, A., Elgendy, N., & Makhlof, N. (2018). Could/should improving the urban climate in informal areas of fast-growing cities be an integral part of upgrading processes? Cairo case. *Urban Climate*, 24, 63-79. <https://doi.org/10.1016/j.uclim.2018.01.007>

Kipper, R. (2009). Cairo: A broader view. In *Cairo's Informal Areas Between Urban Challenges and Hidden Potentials* (pp. 12-15). Norprint SA. https://www.citiesalliance.org/sites/default/files/2019-07/CairosInformalAreas_fulltext.pdf

Labib, Z. (2017, September 22). A plant guidebook for al-Azhar park and the city of Cairo volume I. https://issuu.com/ziaadlabib/docs/issuu_booklet_land-scape

Lefebvre, H. (1991). *The production of space*. Blackwell.

Mahmoud, R. A., & Elrahman, A. S. A. (2016). Social Production of Urban

Space in Informal Areas in the G.C.R "Missing Values & Probable Potential". In S. Attia, S. Shabka, Z. Shafik, & A. Ibrahim (Eds.), *Dynamics and Resilience of Informal Areas* (pp. 113-130). Springer International Publishing. https://doi.org/10.1007/978-3-319-29948-8_7

Migné, L. (2022). ZABBALEEN [Graphic]. <https://lucienmigne.fr/zabbaleen/>

Miller, J. (2016). Aerial photos highlight divide between Cape Town's rich and poor [Graphic]. <https://www.abc.net.au/news/2016-06-23/photographer-highlights-divide-cape-town-rich-and-poor-aerial/7535570>

Mohamed, A. (2015). Cairo's Metropolitan Landscape: Segregation Extreme [Graphic]. <https://failedarchitecture.com/cairos-metropolitan-landscape-segregation-extreme/>

Mohamed, A. A., Ubarevičienė, R., & van Ham, M. (2022). Morphological evaluation and regeneration of informal settlements: An experience-based urban design approach. *Cities*, 128, 103798. <https://doi.org/10.1016/j.cities.2022.103798>

Mostafa, A. M., & Kamel, D. K. (2013). Al-Azhar Park Sustainability: An Environmental Review of a Distinct Model in Local Landscape. In *Sustainable Decision-Making through Integrating Geographic Information Systems into the Entire Environmental Impact Assessment Process* (pp. 162-181).

Mourad, M. (2017, February 27). Heliopolis, Egypt: Politics of Space in Occupied Cairo. *THE FUNAMBULIST MAGAZINE*. <https://thefunambulist.net/magazine/10-architecture-colonialism/heliopolis-egypt-politics-space-occupied-cairo-mahy-mourad>

Murdock, E. G. (2020). A history of environmental justice. In *Routledge eBooks*. <https://doi.org/10.4324/9780429029585-2>

Nahla, D. F. A. M., & Hamed, H. N. A. (2020). The Application of a Proposed Risk Assessment Approach on Rock Failure Hazard on Manshiet Nasser District. *Environmental Research, Engineering and Management*, 76(2), Article 2. <https://doi.org/10.5755/j01.erem.76.2.25490>

Nations, U. (2021). UNData app. <https://data.un.org/en/iso/eg.html>
NC recognized as the birthplace of the environmental justice movement. (2022). [Graphic]. <http://www.northcarolinahealthnews.org/2022/08/26/nc-recognized-as-the-birthplace-of-the-environmental-justice-movement/>

Necipoğlu, G., & Roxburgh, D. (2019). Fatimid Cairo Ceremonial in the City. Lesson 8/22 presentation developed for the Aga Khan Trust for Culture Education Programme. *Archnet*. <https://www.archnet.org/publications/13233>

Ngau, P., & Blanco, Z. (2019). The production of space and place in informal settlements. <https://uonjournals.uonbi.ac.ke/ojs/index.php/ahr/article/view/328>

Noll, S., & Bhar, T. (2023). The Five Pillars of Urban Environmental Justice: A Framework for building Equitable Cities. *Philosophy of the City Journal*, 1(1), 84-99. <https://doi.org/10.21827/potcj.1.1.41048>

Omar, D. (2018). URBAN GROWTH MANAGEMENT POLICIES_ The rise of New Town Policy to deal with urban growth: The Case of Egypt. <https://doi.org/10.13140/RG.2.2.15699.02086>

Piffero, E. (2009). Beyond Rules and Regulations: The Growth of Informal Cairo. In *Cairo's Informal Areas Between Urban Challenges and Hidden Potentials* (pp. 20-27). Norprint SA. https://www.citiesalliance.org/sites/default/files/2019-07/CairosInformalAreas_fulltext.pdf

Pranav. (2013). How Do You Design for Informality? [Graphic]. <https://www.archdaily.com/1012095/how-do-you-design-for-informality/659fa42e99363f7f1a1d8400-how-do-you-design-for-informality-photo>

RT TV-NOVOSTI. (2016). Zabbaleen: Trash Town. <https://www.youtube.com/watch?v=fwrZfZPFIVO&t=1207s>

Salat, S. (n.d.). Social and urban integration in Barrio Mugica (Former Villa 31). UNEP Neighbourhood Guidelines. Retrieved 11 January 2025, from <https://www.neighbourhoodguidelines.org/social-and-urban-integration-in-barrio-mugica>

Samper, J. (2023). An urban design framework of informal development stages: Exploring self-build and growth in informal settlements. In *The Routledge Handbook of Urban Design Research Methods*. Routledge. 10.4324/9781003168621-40

Schmid, C. (2008). Henri Lefebvre's theory of the production of space: Towards a three-dimensional dialectic. In K. Goonewardena, S. Kipfer, & R. Milgrom (Eds.), *Space, Difference, Everyday Life: Reading Henri Lefebvre*. Routledge. <https://doi.org/10.4324/9780203933213>

Séjourné, M. (2009). The history of informal settlements. In *Cairo's Informal Areas Between Urban Challenges and Hidden Potentials* (pp. 16-19). Norprint SA. https://www.citiesalliance.org/sites/default/files/2019-07/CairosInformalAreas_fulltext.pdf

Selim, G. (2015). Between Order and Modernity: Resurgence Planning in Revolutionary Egypt. *Journal of Urban History*, 42, 180-200. <https://doi.org/10.1177/0096144214566980>

Shao, Y., Xie, E., & Gao, C. (2018). New Cairo. Phantom-Urbanism. <http://www.phantom-urbanism.com/new-cairo.html>

Sharp, D. (2022). Haphazard urbanisation: Urban informality, politics and power in Egypt. *Urban Studies*, 59(4), 734-749. <https://doi.org/10.1177/00420980211040927>

Shehayeb, D. (2009). Advantages of Living in Informal Areas. In *Cairo's Informal Areas Between Urban Challenges and Hidden Potentials* (pp. 34-43). Norprint SA. https://www.citiesalliance.org/sites/default/files/2019-07/CairosInformalAreas_fulltext.pdf

Sites International. (n.d.). SITES INTERNATIONAL - Al-Azhar Park. SITES INTERNATIONAL. Retrieved 4 November 2024, from <https://www.sitesint.com/projects/al-azhar-park/>

Stino, M. (2013, November 8). A Garden in Cairo. *The Cairo Review of Global Affairs*. <https://www.thecaireview.com/essays/a-garden-in-cairo/>

SUEZ. (2024). Recycled Plastics | The Climate Tech Handbook [Graphic]. <https://www.climatechhandbook.com/solution-recycled-plastics/>

Tadamun. (2020, June). Manshiet Nasser. https://www.tadamun.co/?post_type=city&p=11354&lang=en&lang=en

Unceta, P. A. M., Hausleitner, B., & Dąbrowski, M. (2020). Socio-Spatial segregation and the spatial structure of 'Ordinary' activities in the global South. *Urban Planning*, 5(3), 303-318. <https://doi.org/10.17645/up.v5i3.3047>

Vignola, G. (2022). Towards the New Vernacular: A Study on Climate-Responsive Buildings in Informal Cairo [Thesis, HafenCity Universität Hamburg]. <https://doi.org/10.34712/142.30>

VRT 1 (Director). (2022, April 4). Tom Waes bezoekt Garbage city in Cairo [Video recording]. <https://www.youtube.com/watch?v=y28ogVwD-k>

Zeneiny, D. (2023). Gallery of Flowing Through Time: The Nile River Shaping Cairo's Architecture and Urban Landscape - 1 [Graphic]. <https://www.archdaily.com/1002185/flowing-through-time-the-nile-river-shaping-cairos-architecture-and-urban-landscape/64858197787072152fd6d94e-flowing-through-time-the-nile-river-shaping-cairos-architecture-and-urban-landscape-photo>

Zwangsleitner, D. (2014). Cairo New Towns - From Desert Cities to Deserted Cities [Graphic]. <https://failedarchitecture.com/cairo-new-towns-from-desert-cities-to-deserted-cities/>

Chapter 1 | Appendix

Project timeline

Fieldwork preparations & findings

- Focus & Planning
- Interview & observation questions
- Environmental Quality Surveys
- Photos case study site

Phasing exploration

Fieldwork

Focus and planning

Fieldwork objective

As part of this research I will be visiting the Zabaleen area in September 2024 to do fieldwork (observing, photography and an environmental survey) as well as a workshop with the inhabitants. I will interview inhabitants and use preliminary design options to talk with them about their view on interviewing in their environment. By doing this I want to take the bottom up approach and take the needs of inhabitants into account.

Workshop objective

The goal of the workshop during fieldwork is to involve inhabitants in the design process and to gather feedback on possible interventions: How would inhabitants want to intervene in the neighbourhood themselves?

To achieve answers to this question the participants would be involved in creating a design/ an intervention in a part of al-Zabaleen during a workshop. The main purpose of the workshop is to have a discussion. The components for the workshop are there to spark the conversation, and will probably change and improve after the fieldwork.

During the workshop a map of the area is to be available, where residents can place different interventions. The design pattern cards will be accompanied by cut-out design elements, that can be placed on the map/ drawing.

	Thursday 19/09/2024	Friday 20/09/2024	Saturday 21/09/2024	Sunday 22/09/2024	Monday 23/09/2024	Tuesday 24/09/2024	Wednesday 25/09/2024	Thursday 26/09/2024
09:00								Departure
10:00		(Egyptian weekend) Last preparation workshop material	General site visit: photos, drawings or notes	Hot spots: revisiting areas. Semi formal interviews	Ain Shams: Processing information, drawings, transcribing	Ain Shams: Preparation of the Workshop	Workshop Day	EgyptAir Flight
11:00								
12:00			(flexibility in schedule)	(flexibility in schedule)				
13:00								
14:00								
15:00								
16:00	EgyptAir Flight							
17:00	15:40-21:15							
18:00								
19:00								
20:00								
21:00								
22:00	Arrival							
23:00								
00:00								

Planning for the site visit

Questions

Interviews and observations

Environmental Health

Contaminants:

- How do you feel about working with litter? Would you do something different if you could? Do you see your children also do this job?
- How would you feel about storage/ sorting further away from home? Would you work with other families? Would you mind walking there?

Green spaces:

- What type of plants grow in the streets?
- Where did they come from? Did they prepare the soil before planting them?
- Who maintains them? How do the plants get watered?

Water:

- Does everybody have access to water?
- Is there a way to clean/ collect/ store water for dry times?

Microclimate:

- How do you experience the heat in summer? Do you mostly stay inside? Do you have a courtyard?
- Do people create their own shade?
- Are some streets better suitable for warm days?

Amenities

- Do you mostly buy food in el Zabaleen? Or do you go somewhere else?
- What do you do when you or your family feels sick? Do you need to travel to get healthcare?
- Where do the kids go during the day? Do they stay at home, play with friends, or go to school?
- Do you have a place where you can meet other families or friends?

Transportation

- Do you (need to) leave el Zabaleen from time to time?
- Which way do you travel most often? By foot, by tuktuk, by microbus?
- Does everyone travel the same way? Do children or elderly people travel in a different way?

Community

- Do you have contact with your neighbours?
- Is there a place where you see other families the most?
- Who do you go to if you have a quarrel with another family?

NGO/ outsiders

- Do outsiders (like me) come here often?
- Have there been initiatives by NGOs/ outsiders in the past? How do you feel about that?
- What did the initiatives focus on? Did they work? Would you have done it differently?
- If you could ask for/ start an initiative, what would you ask for? Why?

Al-Maghar street

Environmental Quality Survey (adapted from Field Studies Council, 22.10.2016)

General Description of the area:

Al-Maghar street. Main shopping street and entry way into the area from the west, Al Seka al Hadid road.

Visited on Saturday 21.09.24 (Weekend day) around 13:00 and 15:30

Buildings

	0	1	2	3	4	5	
High density (many properties within a small space)		x					Low density (few properties, lots of space)
Poor structural or derelict walls and roofs of buildings					x		Walls and roofs of buildings well maintained
No street furniture (street lightning, litter bins, roads signs) or poorly maintained				x			Well maintained street furniture (street lightning, litter bins, roads signs)
Boundary walls and fences in need of repair					x		Boundary walls and fences well maintained
No posters or advertisements						x	Multiple posters or advertisements
General housekeeping (cleanliness of paintwork, windows and curtains) badly maintained					x		General housekeeping (cleanliness of paintwork, windows and curtains) well maintained

21

Environmental Health

	0	1	2	3	4	5	
Much litter					x		No litter
Poor air quality/ smells/ fumes					x		Clean Air
Close to contaminants				x			Safe distance to contaminants
Natural hazardous area (e.g. rock failure)					x		Safe area
No greenery visible				x			Trees/ Shrubs/ greenery visible
No public park		x					Public Park accessible
No shading/ poorly maintained shading				x			Shading visible and attractive
High temperatures/ thermal discomfort					x		Normal temperatures/ thermal comfort

27

Amenities

	0	1	2	3	4	5	
No grocery stores						x	Local food/ grocery stores
No child-care		x					Child-care services
No education opportunities		x					Schools
No health facilities		x					Health facilities
No cafes/ restaurants						x	Cafes/ restaurants
Mono functionality						x	Mixed functions
No companies/ production				x			Companies/ production

21

Traffic

	0	1	2	3	4	5	
Narrow streets		x					Wide streets
Parking is difficult – many vehicles on the road	x						Parking in garages or driveways
Pavement poorly maintained/ non-existent				x			Pavement well maintained
High noise from traffic			x				No traffic noise
Air smells heavily of traffic fumes				x			No smell of car fumes

11

Total Environmental Quality Score Min = 26 Max = 130	78
---	----

- 0 = not applicable
- 1 = very poor
- 2 = poor
- 3 = average
- 4 = good
- 5 = excellent



Location

Mikhail Gergis street

Environmental Quality Survey (adapted from Field Studies Council, 22.10.2016)

General Description of the area:

Mikhail Gergis street. Area in the South-East of Zabaleen, more recent expansion, with many working places, farm animals and storage. Visited on Monday 23.09.24 around 14:00 (Week day). Similar streets in this neighbourhood visited on Saturday 21.09.24 around 15:00 (Weekend day).

Buildings

	0	1	2	3	4	5	
High density (many properties within a small space)		x					Low density (few properties, lots of space)
Poor structural or derelict walls and roofs of buildings		x					Walls and roofs of buildings well maintained
No street furniture (street lightning, litter bins, roads signs) or poorly maintained		x					Well maintained street furniture (street lightning, litter bins, roads signs)
Boundary walls and fences in need of repair		x					Boundary walls and fences well maintained
No posters or advertisements				x			Multiple posters or advertisements
General housekeeping (cleanliness of paintwork, windows and curtains) badly maintained			x				General housekeeping (cleanliness of paintwork, windows and curtains) well maintained

9

Environmental Health

	0	1	2	3	4	5	
Much litter		x					No litter
Poor air quality/ smells/ fumes		x					Clean Air
Close to contaminants		x					Safe distance to contaminants
Natural hazardous area (e.g. rock failure)			x				Safe area
No greenery visible		x					Trees/ Shrubs/ greenery visible
No public park		x					Public Park accessible
No shading/ poorly maintained shading		x					Shading visible and attractive
High temperatures/ thermal discomfort				x			Normal temperatures/ thermal comfort

11

Amenities

	0	1	2	3	4	5	
No grocery stores		x					Local food/ grocery stores
No child-care		x					Child-care services
No education opportunities		x					Schools
No health facilities		x					Health facilities
No cafes/ restaurants		x					Cafes/ restaurants
Mono functionality				x			Mixed functions
No companies/ production						x	Companies/ production

13

Traffic

	0	1	2	3	4	5	
Narrow streets			x				Wide streets
Parking is difficult – many vehicles on the road		x					Parking in garages or driveways
Pavement poorly maintained/ non-existent		x					Pavement well maintained
High noise from traffic		x					No traffic noise
Air smells heavily of traffic fumes			x				No smell of car fumes

7

Total Environmental Quality Score Min = 26 Max = 130	40
---	----

- 0 = not applicable
- 1 = very poor
- 2 = poor
- 3 = average
- 4 = good
- 5 = excellent



Location

Mekhaiel Sharkawi street

Environmental Quality Survey (adapted from Field Studies Council, 22.10.2016)

General Description of the area:

Mekhaiel Sharkawi street. South of Al-Maghar Street with a preparatory school, a health clinic and houses. Visited on Saturday 21.09.24 (quiet, weekend day) around 14:30 and Monday 23.09.24 (busy with children, lunch break).

Buildings

	0	1	2	3	4	5	
High density (many properties within a small space)			x				Low density (few properties, lots of space)
Poor structural or derelict walls and roofs of buildings					x		Walls and roofs of buildings well maintained
No street furniture (street lightning, litter bins, roads signs) or poorly maintained				x			Well maintained street furniture (street lightning, litter bins, roads signs)
Boundary walls and fences in need of repair						x	Boundary walls and fences well maintained
No posters or advertisements			x				Multiple posters or advertisements
General housekeeping (cleanliness of paintwork, windows and curtains) badly maintained					x		General housekeeping (cleanliness of paintwork, windows and curtains) well maintained

20

Environmental Health

	0	1	2	3	4	5	
Much litter			x				No litter
Poor air quality/ smells/ fumes				x			Clean Air
Close to contaminants				x			Safe distance to contaminants
Natural hazardous area (e.g. rock failure)					x		Safe area
No greenery visible					x		Trees/ Shrubs/ greenery visible
No public park		x					Public Park accessible
No shading/ poorly maintained shading				x			Shading visible and attractive
High temperatures/ thermal discomfort				x			Normal temperatures/ thermal comfort

23

Amenities

	0	1	2	3	4	5	
No grocery stores			x				Local food/ grocery stores
No child-care				x			Child-care services
No education opportunities					x		Schools
No health facilities					x		Health facilities
No cafes/ restaurants			x				Cafes/ restaurants
Mono functionality					x		Mixed functions
No companies/ production				x			Companies/ production

22

Traffic

	0	1	2	3	4	5	
Narrow streets					x		Wide streets
Parking is difficult – many vehicles on the road		x					Parking in garages or driveways
Pavement poorly maintained/ non-existent				x			Pavement well maintained
High noise from traffic				x			No traffic noise
Air smells heavily of traffic fumes			x				No smell of car fumes

13

Total Environmental Quality Score Min = 26 Max = 130	78
---	----

- 0 = not applicable
- 1 = very poor
- 2 = poor
- 3 = average
- 4 = good
- 5 = excellent



Location

Seka al Hadid road

Environmental Quality Survey (adapted from Field Studies Council, 22.10.2016)

General Description of the area:

Old tram tracks next to al Seka al Hadid road. Next to the highway in the west of the area with cafes and lined by trees. Visited on Saturday 21.09.24 (Weekend day) around 13:00 and 16:00 and Monday 23.09.24 (Weekday) around 11:30 and 15:30.

Buildings

	0	1	2	3	4	5	
High density (many properties within a small space)					x		Low density (few properties, lots of space)
Poor structural or derelict walls and roofs of buildings				x			Walls and roofs of buildings well maintained
No street furniture (street lightning, litter bins, roads signs) or poorly maintained				x			Well maintained street furniture (street lightning, litter bins, roads signs)
Boundary walls and fences in need of repair				x			Boundary walls and fences well maintained
No posters or advertisements				x			Multiple posters or advertisements
General housekeeping (cleanliness of paintwork, windows and curtains) badly maintained				x			General housekeeping (cleanliness of paintwork, windows and curtains) well maintained

19

Environmental Health

	0	1	2	3	4	5	
Much litter			x				No litter
Poor air quality/ smells/ fumes			x				Clean Air
Close to contaminants			x				Safe distance to contaminants
Natural hazardous area (e.g. rock failure)					x		Safe area
No greenery visible						x	Trees/ Shrubs/ greenery visible
No public park		x					Public Park accessible
No shading/ poorly maintained shading					x		Shading visible and attractive
High temperatures/ thermal discomfort					x		Normal temperatures/ thermal comfort

24

Amenities

	0	1	2	3	4	5	
No grocery stores		x					Local food/ grocery stores
No child-care			x				Child-care services
No education opportunities		x					Schools
No health facilities		x					Health facilities
No cafes/ restaurants						x	Cafes/ restaurants
Mono functionality						x	Mixed functions
No companies/ production				x			Companies/ production

18

Traffic

	0	1	2	3	4	5	
Narrow streets			x				Wide streets
Parking is difficult – many vehicles on the road	x						Parking in garages or driveways
Pavement poorly maintained/ non-existent		x					Pavement well maintained
High noise from traffic		x					No traffic noise
Air smells heavily of traffic fumes		x					No smell of car fumes

5

Total Environmental Quality Score Min = 26 Max = 130	66
---	----

- 0 = not applicable
- 1 = very poor
- 2 = poor
- 3 = average
- 4 = good
- 5 = excellent



Location

Case Study | Photos



View from the pigeon tower to the north on the parking lot



View from the pigeon tower to the north on the main street



Eye height view to the east entering the parking lot



View from the pigeon tower to the south-east

Test | Strategy phasing



1. Individual projects urban



2. Individual projects community, collaborating with urban

Title (source, xxxx)



5. Gradual development recycling zone, negotiating with urban and community for appointed work spaces



6. Optimising the recycling zone and moving hazardous work to industrial areas, negotiating with urban and community for innovation centres

Title (source, xxxx)



3. Individual projects recycling

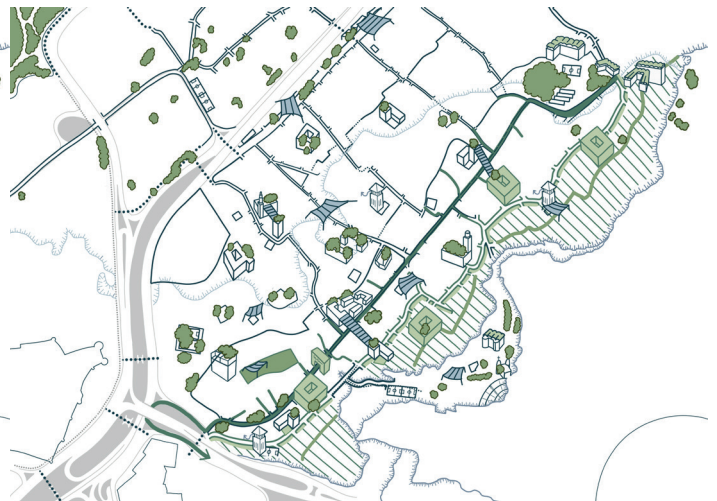


4. Individual projects recycling, collaborating with urban, stimulating the bazaar

Title (source, xxxx)



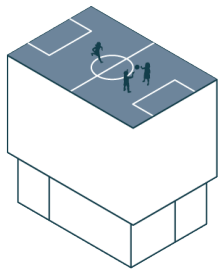
7. Giving back space to the community, negotiating with urban and recycling for community spaces



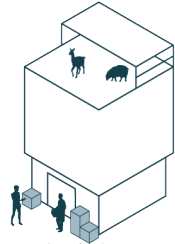
8. Formal recognition of Zarayb, negotiating with community for break through

Title (source, xxxx)

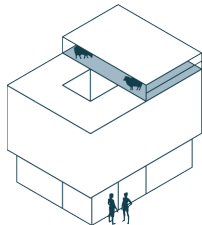
Design phasing



Community centre



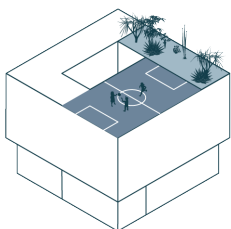
Upcycling facility



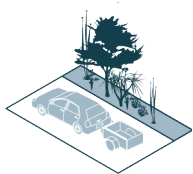
Recycling facility



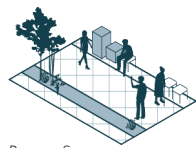
Phase 1: Individual



Innovation centre



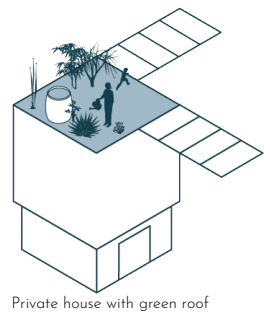
Buffer Street



Bazaar Street



Phase 2: Negotiation



Phase 3: Collaboration

Legend

- Zarayb housing zone
- Zarayb recycling zone
- Park
- Community attraction
- Privately owned terrain
- Urban connection: streets
- Community connection: walk
- Recycling connection: bazaar
- Urban intervention
- Urban densification
- Community focus area
- Recycling innovation centres
- Public Transport stop
- + Healthcare

