Missing Link #12
The Power of Infrastructure
Nairobi, Kenya

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Urbanism & Societal Change
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Unit Director: Deane Simpson

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Royal Danish Academy

Architecture
Design
Conservation

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11.02.2021

List of Acronyms

KeNHA	Kenya National Highways Authority
KURA	Kenya Urban Roads Authority
NCCG	Nairobi City County Government
NMT	Non-Motorized Transport

Kenyan Shilling (KES) 1000 = Danish Krone (DKK) 54
KES 1 000 000 = DKK 55 200

Contents

↑ On the Northern outskirts of Kibera, with the beginning of the Missing Link 12 road in the background (Brian Otieno)

Executive summary

Extensive multilateral infrastructure investments are changing the city of Nairobi at a tremendous speed, but tend to only favour a small part of the city's inhabitants. The development is being realized without regard to physical context and worsening the mobility for already vulnerable citizens. The city is developing with two opposing visions: to construct 8-lane highways through the inner city, and to make the city greener and more friendly to non-motorized transport users.

Missing Link 12 is the infrastructural project to connect the main east-west arterials in Nairobi through the informal settlement of Kibera. The 60 m wide road is designated for long-distance travel to and increase the connectivity of the city, yet completely ignores the consequences of displacing residents and hindering movement within Kibera (Kounkuey Design Initiative, 2018). The mega project highlights the issue of exclusion and inclusion of various communities, one blocked by a new boundary, a second boosted by high-speed travel.

With this project, I want to develop a new strategy for the Missing Link 12 road, exploring how the road could be reprogrammed to better fit the context and the needs of local residents. Zooming in on one of the intersections between an existing road in Kibera and the Missing Link 12 road I will be working with a new productive public space program coupled with the implementation of basic ecological infrastructure.

Due to the travel restrictions caused by Covid-19, the project will be developed in Copenhagen with the help of local Kiberan residents, investigating and studying the site through their personal experiences.

Societal theme

The Power of Infrastructure

Infrastructures are the built systems that provide a blueprint for our cities - enabling the flow of water, goods, people and power. As physical structures they are often only recognized as a technical necessity, seldom held accountable for the ability to both facilitate and deprive networks of mobility. Infrastructural injustice lies not only the absence or inadequacy of it, for example the lack of clean water or sewage systems in an informal settlement. It is also present in the excess of it, for example the destruction of homes and displacement of people due to new highways being constructed. In colonial contexts, the use of infrastructure as an instrument of violence and control is still evident today, continuously connecting people to recourses and spaces, often by restraining them from others (Cowen, 2017).

Today, infrastructure at every scale is promoted by multilateral corporations and private equity firms and has become the preferred way of spatially fixing capital. Cities and regions want to strengthen its infrastructure to ease congestion, lower emissions and expedite gentrification. Governments are looking to build highways, bridges and walls, all of which are becoming more privatised and logistical.

Further, infrastructure also has the power of transformation, Cowen (2017) writes "Alternative worlds require alternative infrastructures, systems that allow for sustenance and reproduction". In opposition to top-down infrastructure, communities and networks are constantly creating new alternatives that respond to their own needs and desires of a different future (Cowen, 2017).

→ The 60 m wide void through Kibera (Brian Otieno)

"[In the beginning] people liked it you know, but when it came people didn't like it, because it started with eviction, evicting many people from the slum. And now they stopped construction and people don't have houses."

"But people in the community were saying, like me, those people have divided Kibera, they've sold Kibera. […] it's like a border, a boundary, this side of Gatwakwea, Kisumu Ndogo, this is Kibera now and the other side they want to upgrade. […] Those are the fears of the people in the ghetto, we are not used to living like that […], but some people say this is development."

-Daniel 'Futwax' Owino Okoth

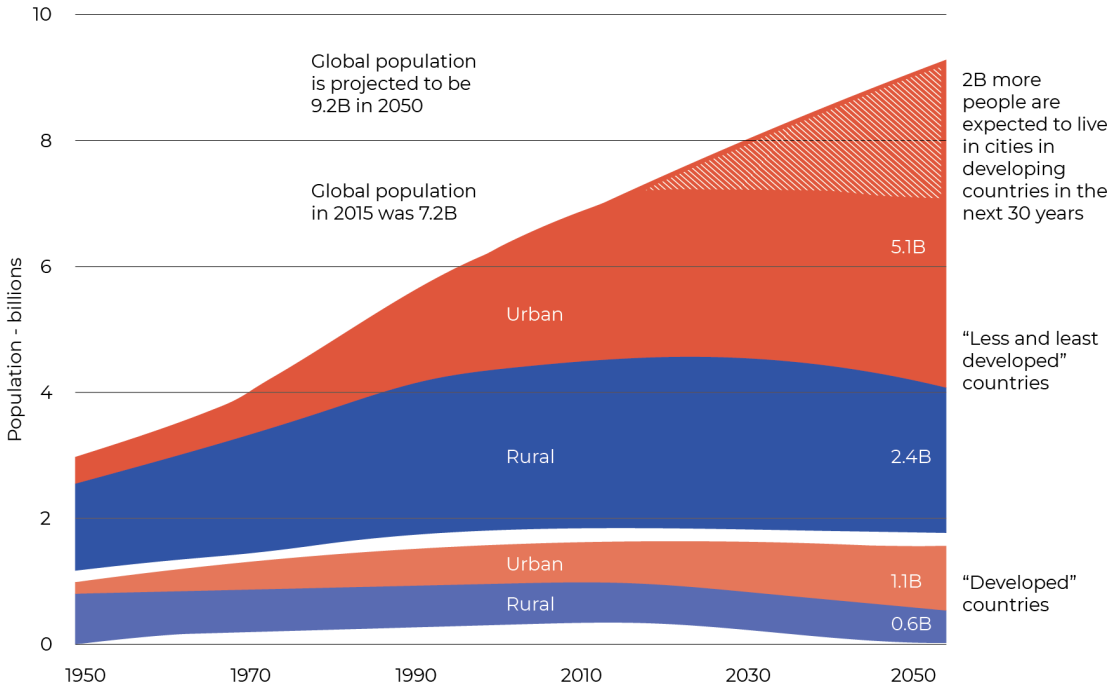
Informal Urbanisation

The pull of cities in the growing megacities of the Global South has never been stronger. Approximately 90 % of the urban growth expected in the next 30 years will take place in Africa and Asia, a majority of which will be informal and unplanned. The rapid population influx stems from many causes, but all centre on the ambition to improve living conditions and well-being. An additional 2 billion people are expected to live in cities in developing countries in the next 30 years and many of these cities are grappling with providing basic infrastructure for their growing populations. In many emerging economies the pace of urbanisation has exceeded that of infrastructural development and investment. The impacts are most significant on the living conditions of the urban poor - often unsanitary and unsafe – as well as having to pay a significant portion of monthly incomes on basic services like public transport and water (Brown & Stigge, 2017, p. 5-7).

↙ The railway tracks passing through the northern part of Kibera (Brian Otieno)

↓ People passing the northern outskirts of Kibera by foot, car and 'boda boda' (Brian Otieno)

→ World urbanisation prospects 1950-2050 (Source: Brown & Stigge, 2017)


10
8
6
4
2
0
Population - billions
1950
1970
1990
2010
2030
2050
Global population is projected to be 9.2B in 2050
Global population in 2015 was 7.2B
Urban
5.1B
Rural
2.4B
Urban
1.1B
Rural
0.6B
2B more people are expected to live in cities in developing countries in the next 30 years
"Less and least developed" countries
"Developed" countries

Nairobi Streetscapes

Nairobi is Kenya's capital and largest city. It serves as a key transport and economic hub both in Kenya and the whole region of East Africa. The city is still today confronted with the legacies of colonial planning that continue to enforce unequal mobility and uneven access to basic services, shelter and work (Mwau et al., 2020, p. 13-16). After Kenya's independence in 1963, rural-urban migration expanded the city rapidly and the lack of basic services and affordable housing led to the emergence of informal housing and neighbourhoods on both public and private land. Today, informal settlements occupy merely 2 % of Nairobi, yet home half of the city's population (Lines & Makau, 2018, p. 407).

The main modes of transportation in Nairobi are walking and matatu, 14-seat minibuses, and are both fundamental for low-income residents. Travelling on foot makes up 45 % of all trips in the city, public transportation 40 % and private cars only 15 % (NCCG, 2015, p. 3). Access to work opportunities varies greatly depending on access to transportation. Within 45 min of travel, a Nairobi car user has access to 58% of all work opportunities, whereas a resident travelling by foot or matatu only has access to 10 % in the same travel time. However, many low-income neighbourhoods are located close to the city centre or other work opportunities and are not restricted by geographical distances. It is instead the unaffordability of public transport and lacking pedestrian infrastructure that blocks their access (Mwau et al., 2020, p. 34). A typical Kibera resident spends nearly half of their income on public transportation (Davis, 2007, p. 94).

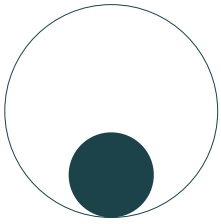
↑ Traffic on Ngong Road (Brian Otieno)

↗ Kenya, Africa

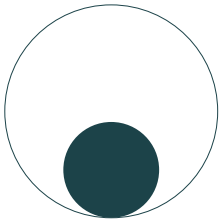
→ Nairobi, Kenya

In 2015 the Nairobi City County Government (NCCG) realized the Non-Motorised Transport Policy with the ambition of "(...) ensuring equitable transport access." (NCCG, 2015, p. i). Non-motorised transport (NMT) is given the least priority in planning and infrastructural investments, despite it the most common mode of transportation (UN Environment Programme, 2020). Even though NMT and public transport are used by more than 80 % of its residents, it is only allocated 20% of the Nairobi County transportation budget. The city's investments show a clear preference to large-scale vehicle infrastructure, increasing land value speculation and the speed of urban sprawl (Mwau et al., 2020, p. 36).

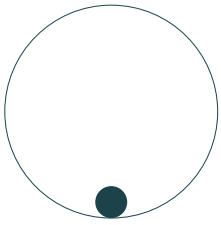
Main modes of transportation:



Public transport 40%



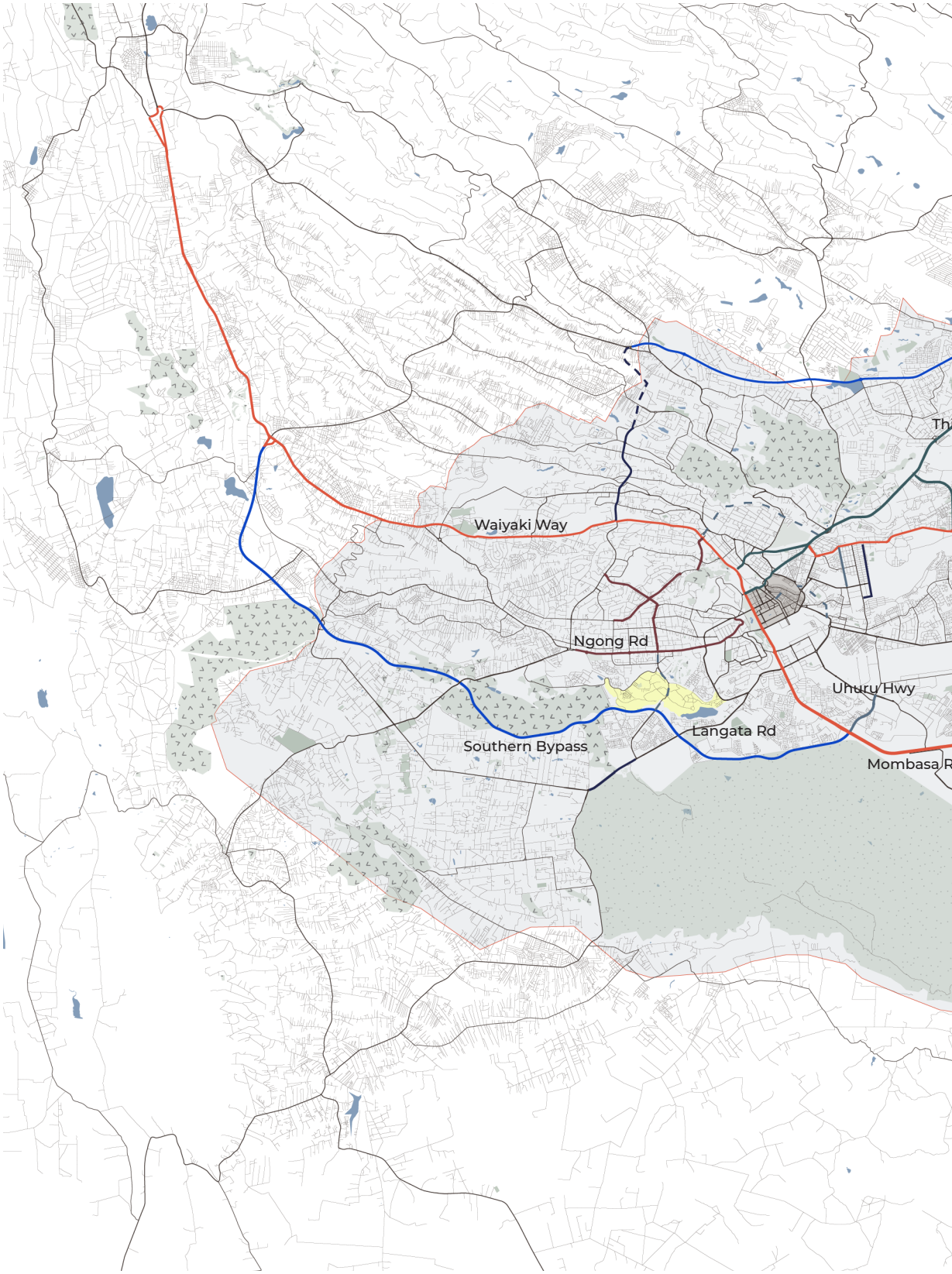
Walking 45%

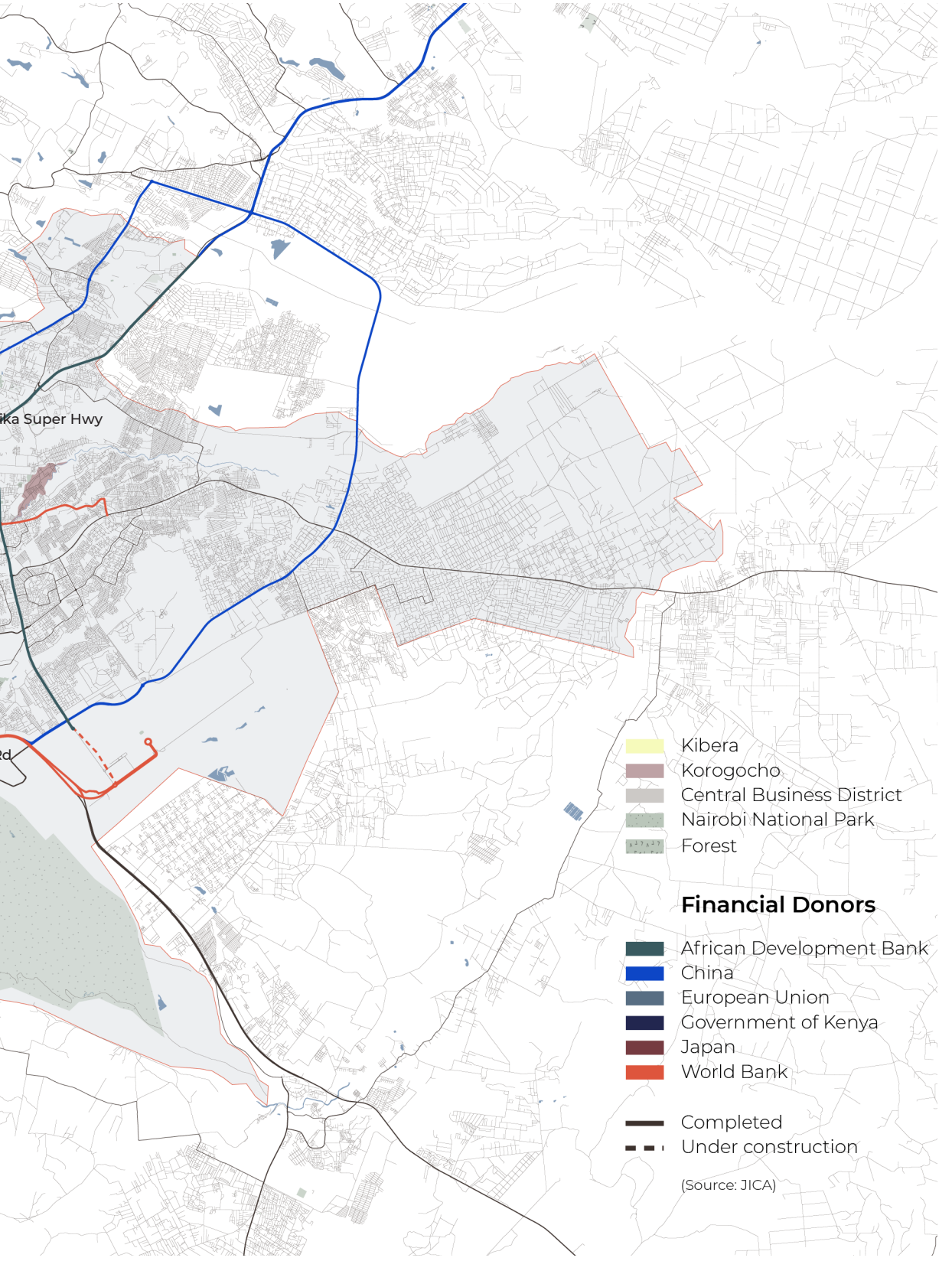


Private cars 15%

← Street vendors and ‘boda boda’ motorcycle taxis on Ngong Road (Brian Otieno)

→ Main modes of transportation in Nairobi (Source: NCCG, 2015)


Waiyaki Way
Ngong Rd
Uhuru Hwy
Langata Rd
Southern Bypass
Mombasa R


ika Super Hwy
Rd
Kibera
Korogocho
Central Business District
Nairobi National Park
Forest
Financial Donors
African Development Bank
China
European Union
Government of Kenya
Japan
World Bank
Completed
Under construction
(Source: JICA)

Kenya 2030

In 2008 the Kenya Vision 2030 was initiated by the previous president Mwai Kibaki, aiming to transform the country into a "rapidly industrialising middle-income nation by the year 2030" (Kenya Vision 2030, 2008b). A substantial part of the vision is the 'Expansion of Roads Programme', enhancing domestic and regional trade through the rehabilitation and construction of approximately 5500 km of roads. An additional 1700 km of walkways for NMT users will be constructed together with the National Road Safety Programme (Kenya Vision 2030, 2008a).

Kenya is leading in the use of mobile technology and already in 2009 implemented a fibre optic cable project to enhance communication and cheap internet connectivity in the country (Kenya Vision 2030, 2008b). The extensive use of mobile phones (92% in 2017) has allowed for mobile payment apps (e.g. M-Pesa) to govern a considerable part of the country's GDP (Gibbon, 2017, p. 12). This has also led to the development of social media-based map-making services, that are dynamic and participatory in their very nature and allow local citizens to become editors. These technologies have a huge potential in facilitating development and urban planning, particularly in informal settlements where physical conditions are in constant change (Ese, 2014, p. 117).

The decisions of road construction and maintenance in Nairobi is split between three governmental bodies; Nairobi County Government (NCG), Kenya Urban Roads Authority (KURA) and Kenya National Highways

Authority (KeNHA) and decision making is therefore divided between national and city government as well as political figures (Cummings & Obwocha, 2018, p. 21).

The politics of Nairobi's road infrastructure is moving in two distinct, oppositional directions. The first is the political shift to a more walkable and greener city, favouring NMT users. The second, vast investments in large-scale infrastructural projects, financed and contracted mainly by Japanese and Chinese engineering companies. The majority of Nairobi's citizens are affected by mobility and congestion issues, but rather than focusing on public transportation, budget priorities are given to the advancement of vehicle roads and car ownership (Cummings & Obwocha, 2018, p. 23).

↖ Rendering of the elevated section of Nairobi Expressway (Kimuyu, 2019)

→ Screenshots from KeNHA promotional video of the new Nairobi Expressway (Kenya National Highways Authority, 2020)

↓ (Following spread) The spatial transformation of Kibera after the demolitions (Mottelson, 2019)

Missing Link #12

On July 23rd 2018 more than 3000 homes, as well as clinics, schools and churches were demolished to give way for the new road. With only two weeks notice, more than 20 000 people were displaced from their homes (Mottelson, 2019, p. 56-57). The Kenya Urban Roads Authority (KURA) claim that the demolished buildings were illegal and occupy state-owned land, even though the land was given Nubian[1] title deed by the government in 2017 (Kounkuey Design Initiative, 2018).

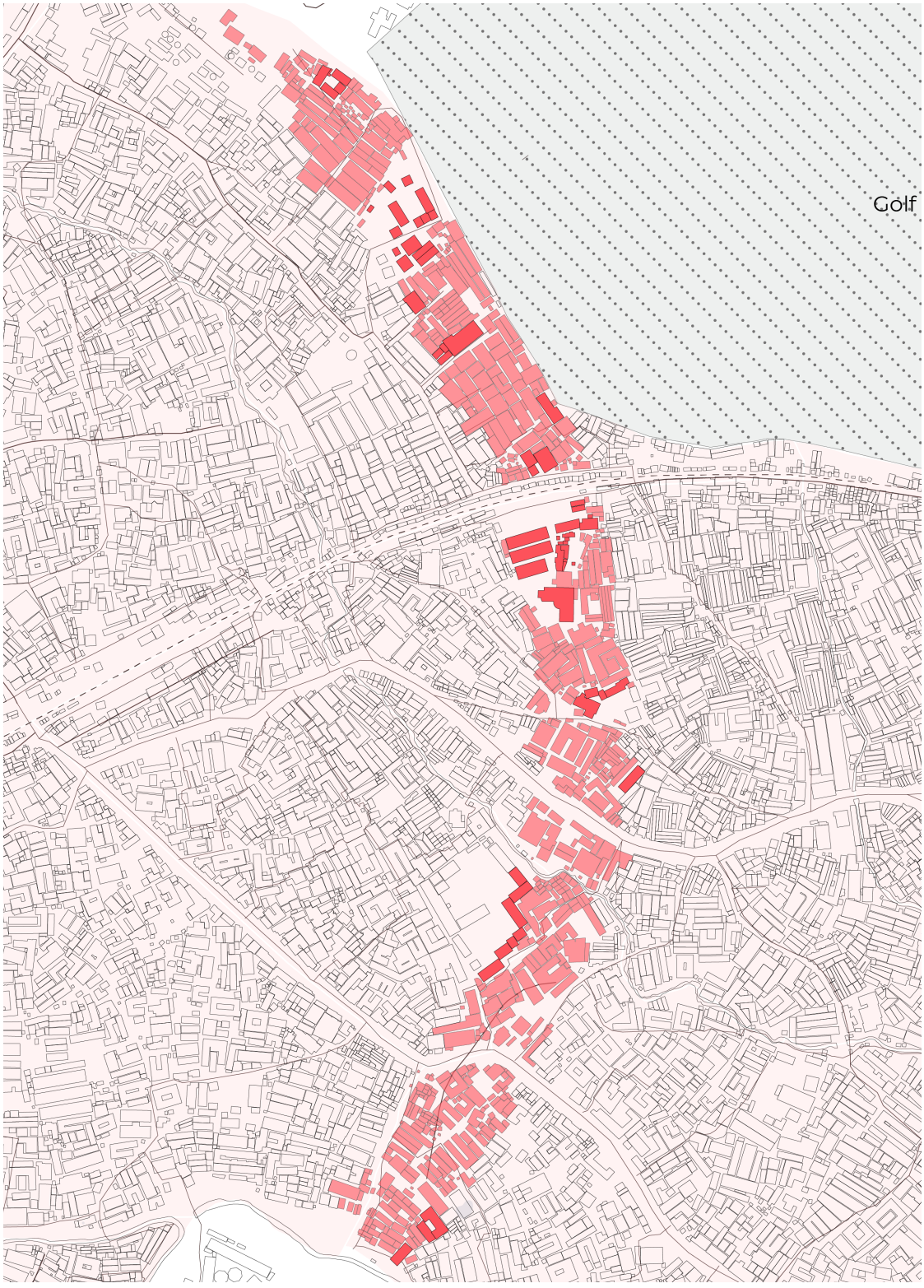
Missing Link 12 is the disputed infrastructural project to connect the main east-west arterials in Nairobi, the Sothern Bypass and Ngong Road. The project is contracted by H Young & Co (EA) Ltd with a budget of KES 2.1 billion. The construction of the 4.2 km multi-lane road is part of Nairobi's rapidly growing road network is argued to ease the congestion problem in the city. It comes with a promise of a mobile, blooming and more connected city, but ultimately neglects the disastrous effects of tearing a major residential area in two (Kounkuey Design Initiative, 2018). Today, the project sits as a 60 m wide void in the centre of Kibera after displacing residents, businesses and schools and continuing to hinder movement within the settlement (Mottelson, 2019, p. 56-57).

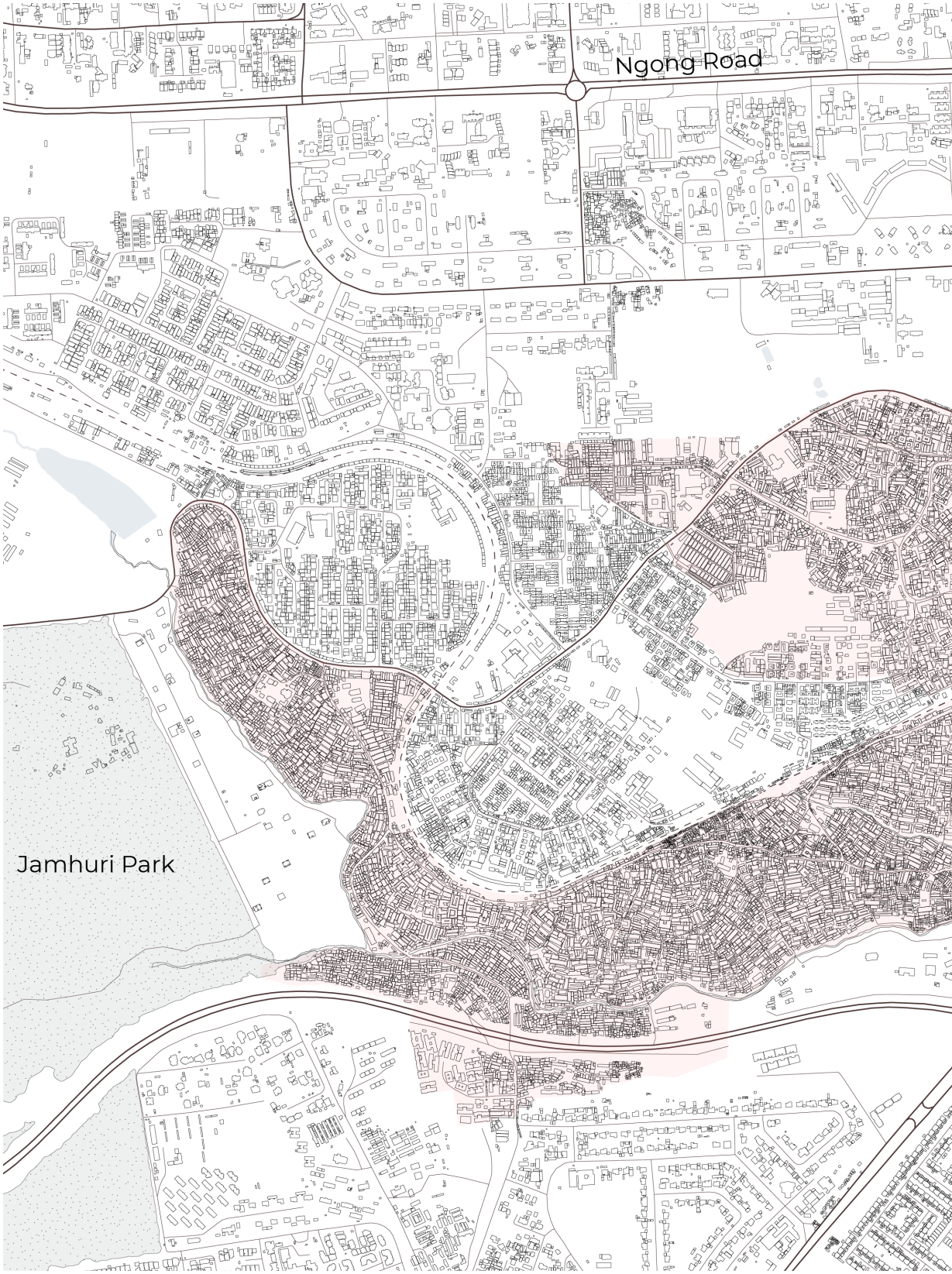
The Missing Link 12 project is a clear example of the spatial injustice that is prevalent today in the Global South in general and in Kenya in particular. Large-scale infrastructure projects that are built without regard to inhabitants or physical context and worsen the mobility for already vulnerable citizens.

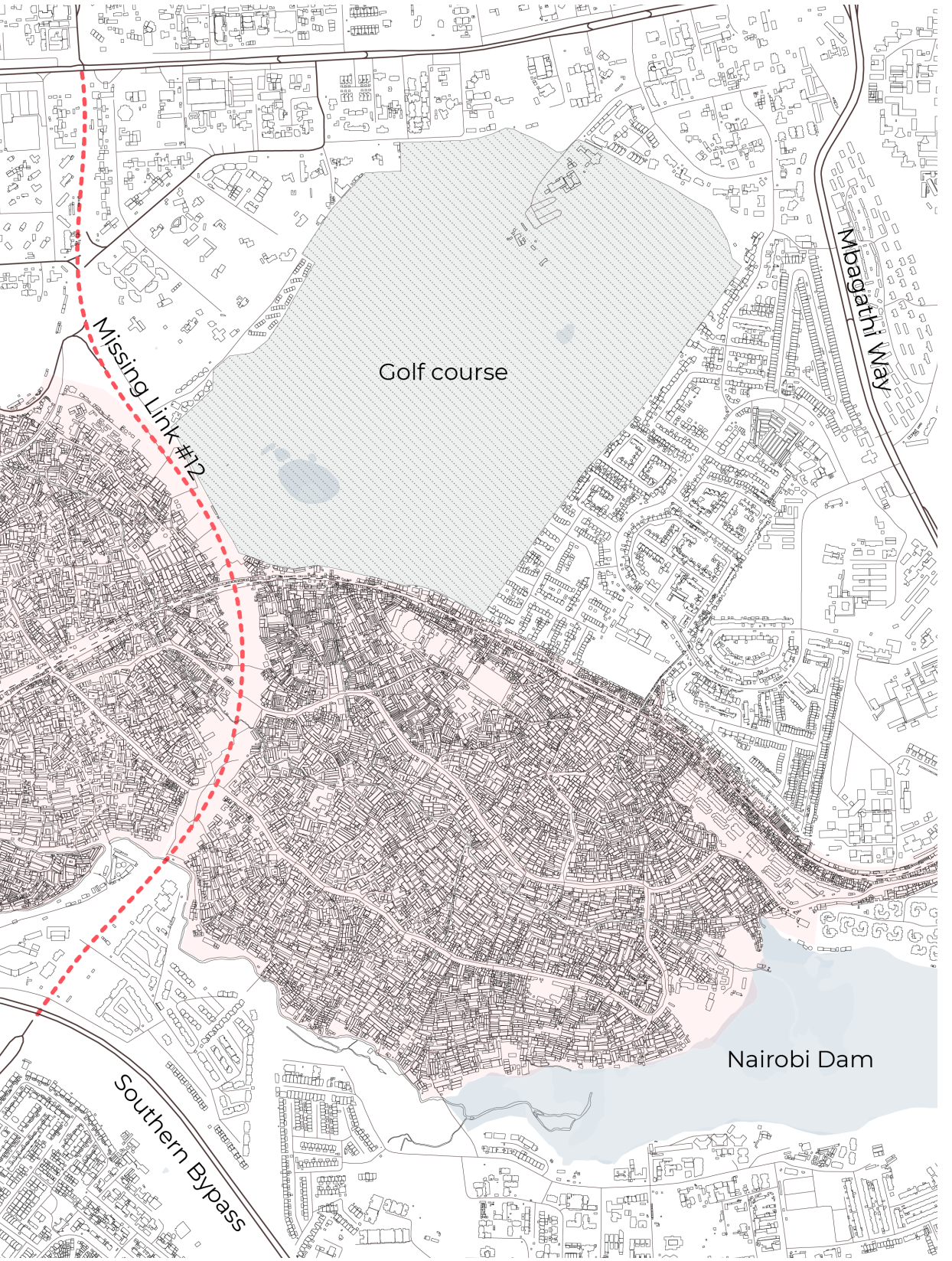
[1] The Nubian people of Kenya are around 100 000 inhabitants today. Originally from Sudan territory, people were brought over in the early 1900s to serve in the British colonial armed forces and were later forcefully allocated to Kibera and other parts of Kenya. The Nubian people have been discriminated against since colonial times and are still considered "squatters" in Kibera, without formal property rights (Open Society Justice Initiative, 2020).

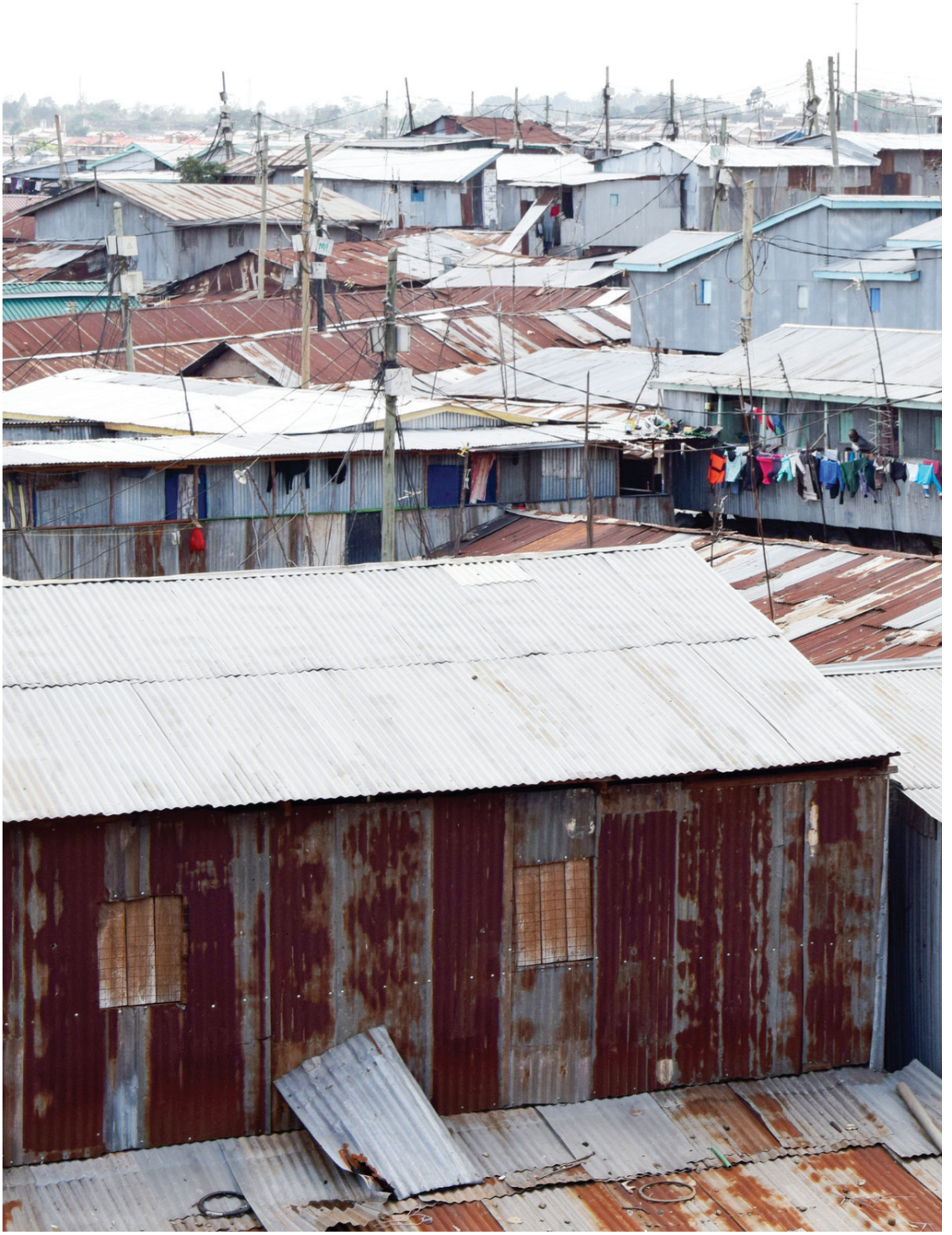
↑ The road as a construction site in Kibera (Brian Otieno)

→ Demolished buildings in 2018, schools marked in dark pink (Source: Kounkuey Design Initiative, 2018)


Golf

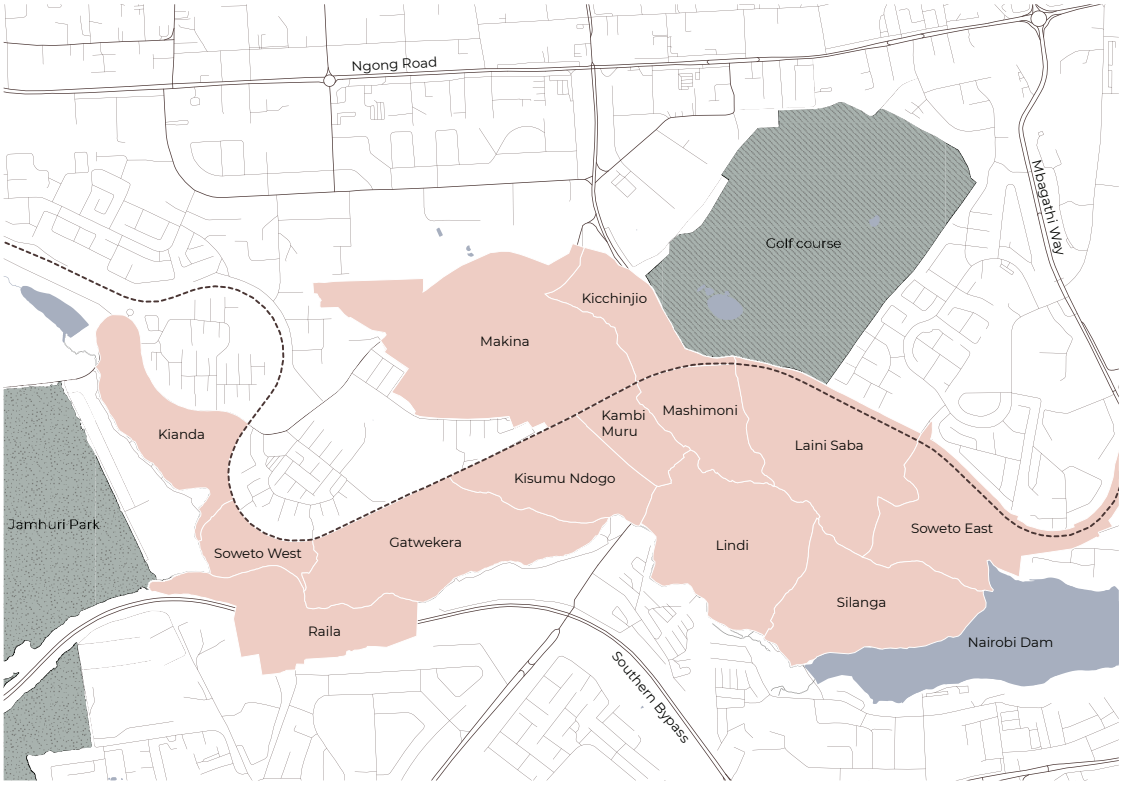

Ngong Road
Jamhuri Park


Golf course
Mbagathi Way
Missing Link #12
Nairobi Dam
Southern Bypass



Kibera

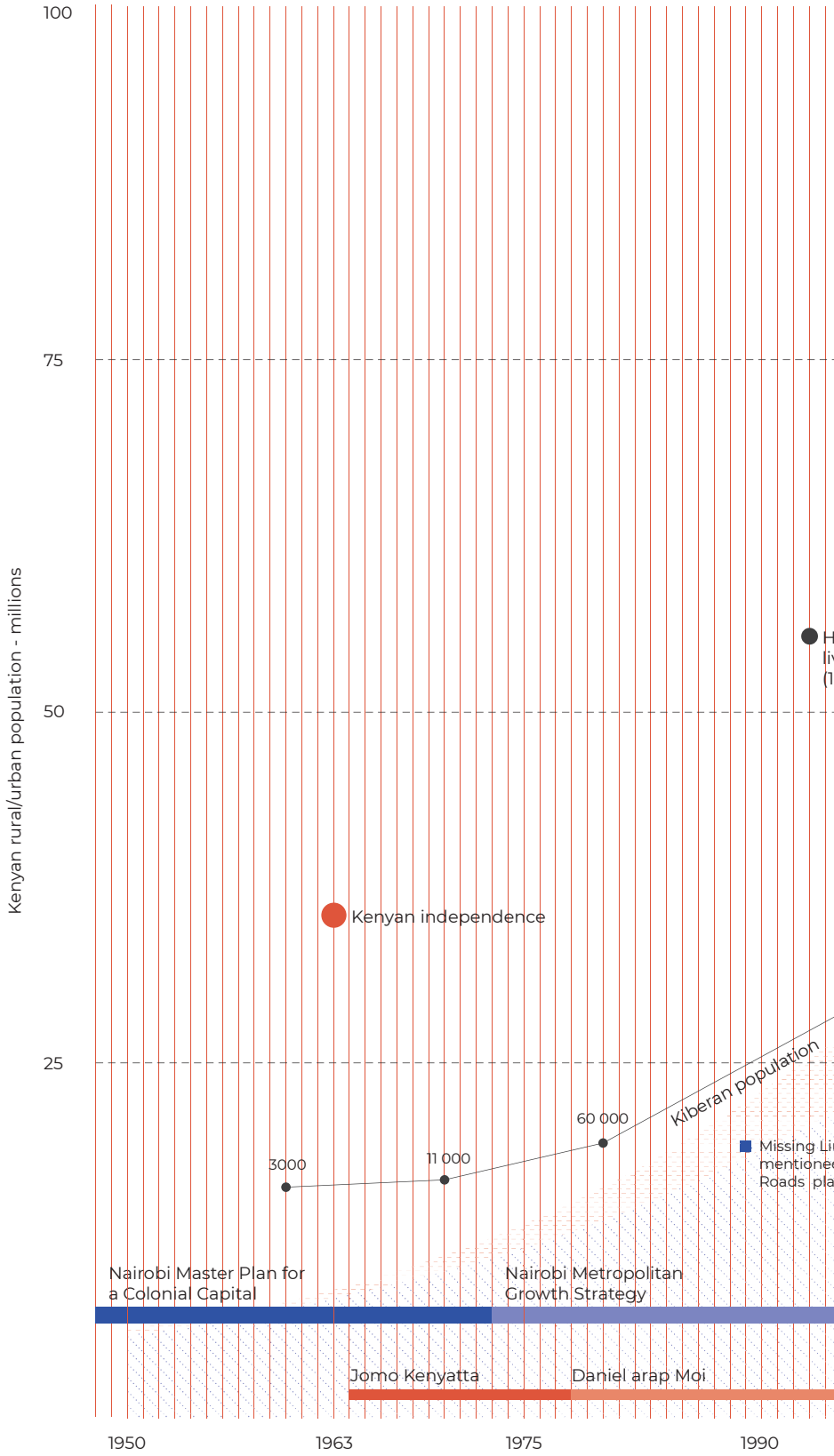
Kibera is the largest informal settlement in Africa, home to around 250 000 residents and characterized by overcrowding, lack of waste management, sanitation services as well as high unemployment. Yet despite social, environmental and economic challenges, Kibera is also an area of entrepreneurship, community activism and inventiveness (Kounkuey Design Initiative, 2021). Kibera consists of 13 villages that cover 256 hectares of land and is situated 6 km southwest of Nairobi city centre.

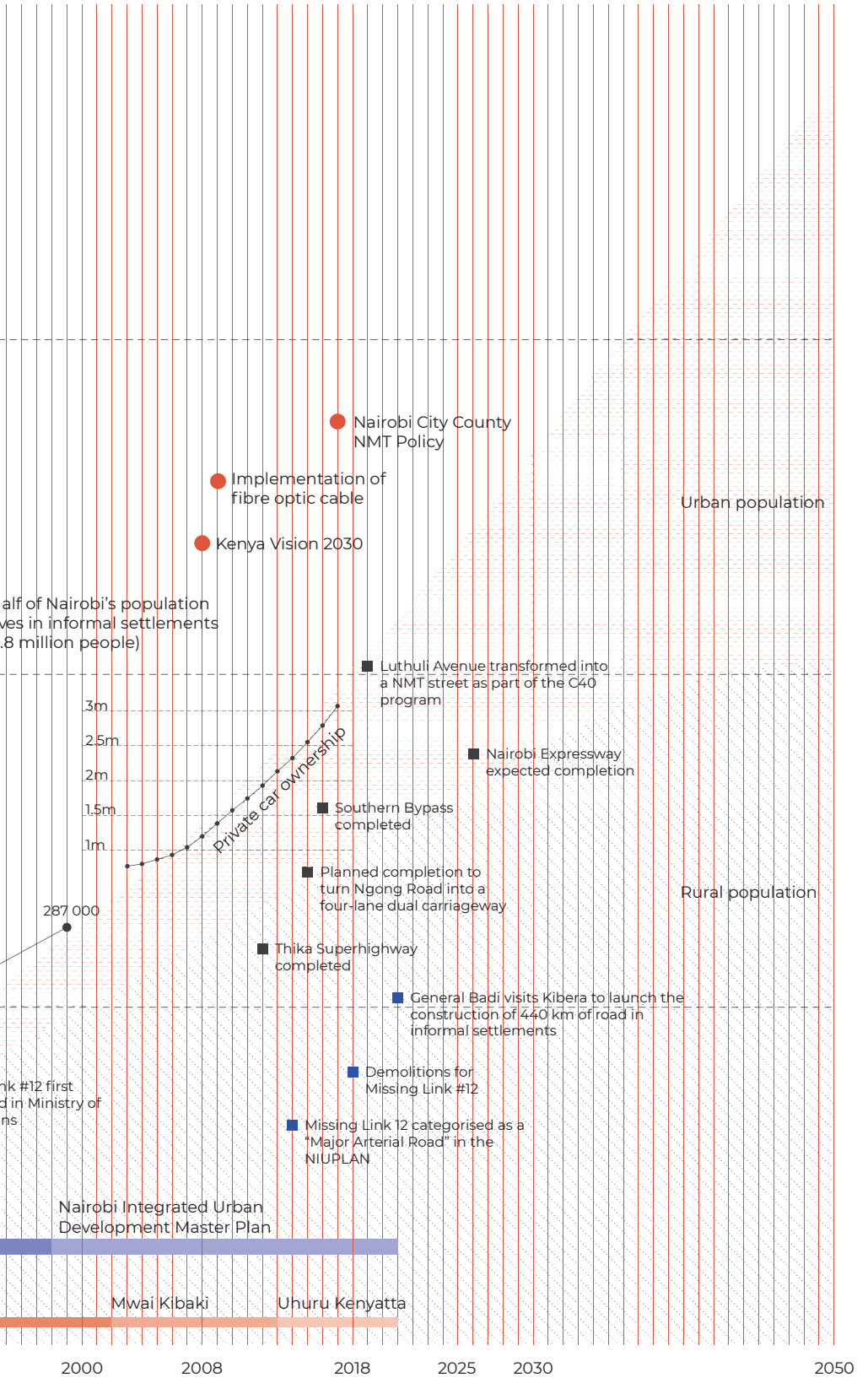


In informal settlements in general, and Kibera, in particular, the street is often the only common public space available. The open public spaces within Nairobi's informal settlements amounts to only 1.17%, compared to the city average of 5.32%. These spaces are put under enormous pressure, given that half of the city's population reside in informal settlements (Mutai et al., 2020, p. 41). The street, therefore, becomes a vital, multi-functional space for public life, functioning as spaces of democracy as well as economic and social development. These spaces were not designed to be playgrounds or markets, but are shaped by the people using them, adapted by their needs and ability to claim public space (Höök et al., 2012).

← Houses in Kibera (Mottelson, 2019)

↑ The 13 villages of Kibera, that lies between Ngong Road and the Southern Bypass as well as Jamhuri Park and Nairobi golf course


100
75
50
25
Kenyan rural/urban population - millions
Kenyan independence
3000
11 000
60 000
Kiberan population
Missing Li
mentioned
Roads pla
Nairobi Master Plan for
a Colonial Capital
Nairobi Metropolitan
Growth Strategy
Jomo Kenyatta
Daniel arap Moi
1950
1963
1975
1990


Nairobi City County NMT Policy
Implementation of fibre optic cable
Kenya Vision 2030
Urban population
alf of Nairobi's population
ves in informal settlements
.8 million people)
Luthuli Avenue transformed into a NMT street as part of the C40 program
3m
2.5m
2m
1.5m
1m
Private car ownership
Nairobi Expressway expected completion
Southern Bypass completed
Planned completion to turn Ngong Road into a four-lane dual carriageway
Rural population
287 000
Thika Superhighway completed
General Badi visits Kibera to launch the construction of 440 km of road in informal settlements
Demolitions for Missing Link #12
Missing Link 12 categorised as a "Major Arterial Road" in the NIUPLAN
nk #12 first
d in Ministry of
ns
Nairobi Integrated Urban Development Master Plan
Mwai Kibaki
Uhuru Kenyatta
2000
2008
2018
2025
2030
2050

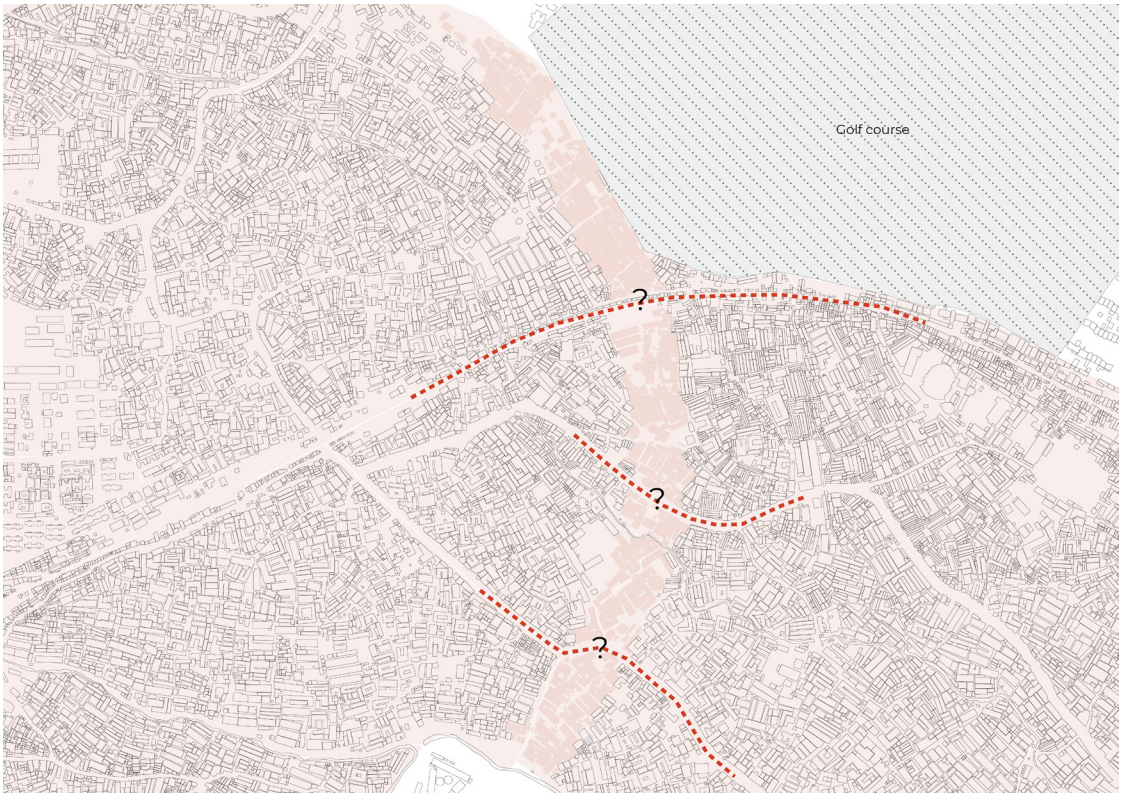
↖ The Missing Link road as a construction site

← The southern part of Kibera, road crossing over Nairobi River

↑ Kibera settlement with the new road dividng it in two

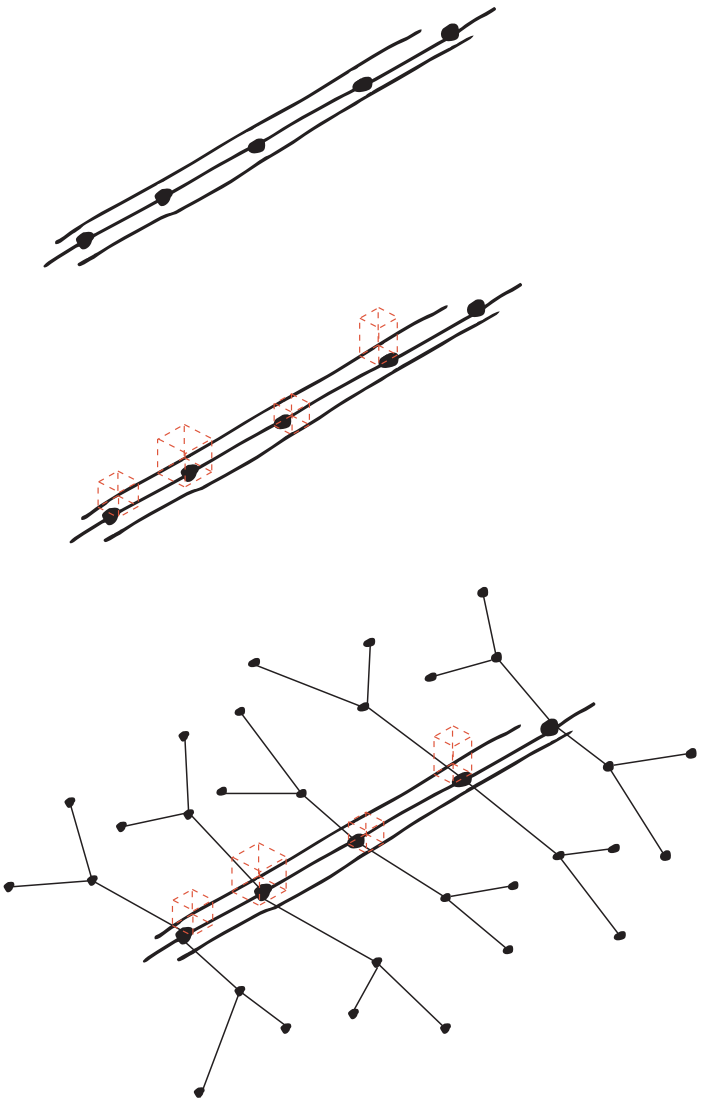
(Brian Otieno)

Program



With this project, I want to explore what the Missing Link road could look like if it was constructed to benefit the residents of Kibera, and further investigate how it could function as a catalyst to implement basic infrastructure in the area. How can it be adjusted to promote the NMT users in the area and can it help increase mobility within Kibera?

The project aims to transform the road by seeing the potentials of the construction and focusing on one of the new intersections that have been created with the new road. Parts of the road will be re-designed according to the guidelines of the NMT Policy for Nairobi. The first step of the development of the project is to work with ecological infrastructure systems and connect the city's existing water and sewage systems below ground. The new open system will become a foundation for productive public spaces above ground, ranging from a decentralised sanitation facility, market spaces along the road and new matatu stops.



1. Establish basic infrastructure below ground

2. Implement productive public spaces connected to infrastructure points

3. Expand the new network through Kibera

Site

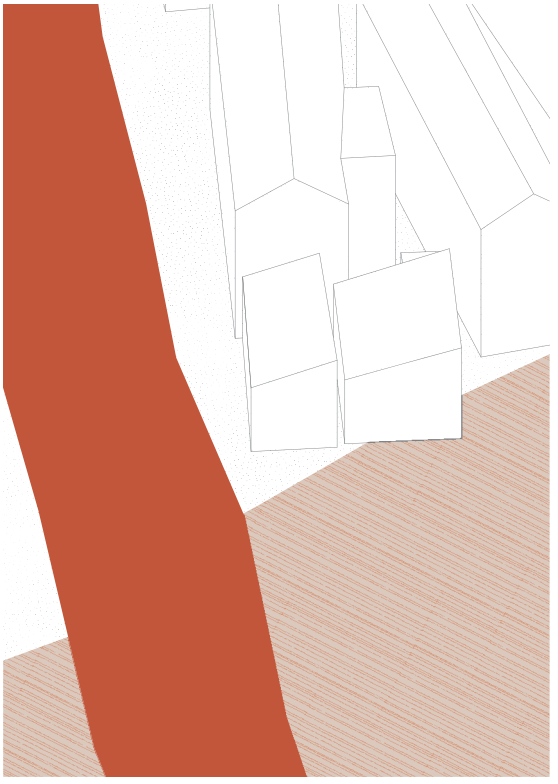
The project will inject itself in the current conditions, with a road that is not yet paved and has been stalled since the demolitions in 2018. I will be working below ground with new ecological infrastructure systems, and above ground, combining these new systems with productive public spaces. I will be working on three different scales, with the main focus on the medium scale of 1:500.

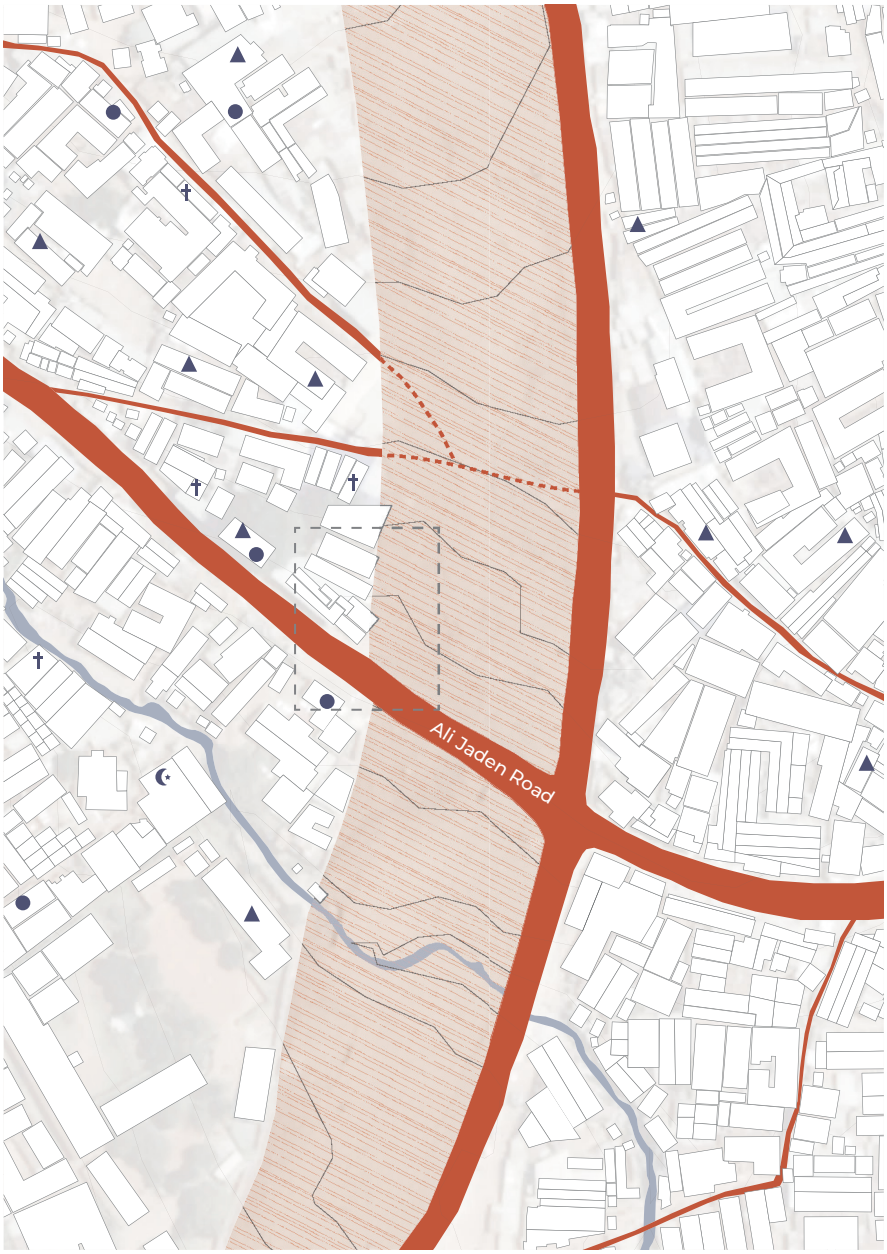
The largest scale, 1:10 000, spanning a bigger part of Kibera will explore connectivity and mobility networks on a strategic scale. In the medium scale, 1:500, I will zoom in on the new intersection created between Missing Link 12 and Ali Jaden Road and develop a new design for the road together with the implementation of productive public spaces. Lastly, the smallest scale, 1:50, will be used to test design alternatives for a new productive public space connected to sanitation and water facilities.

→ Site in 1:10 000 on A3

↘ Site in 1:500 on A2

↓ Site in 1:50 on A2





▲ Education

● Drinking water

† Church

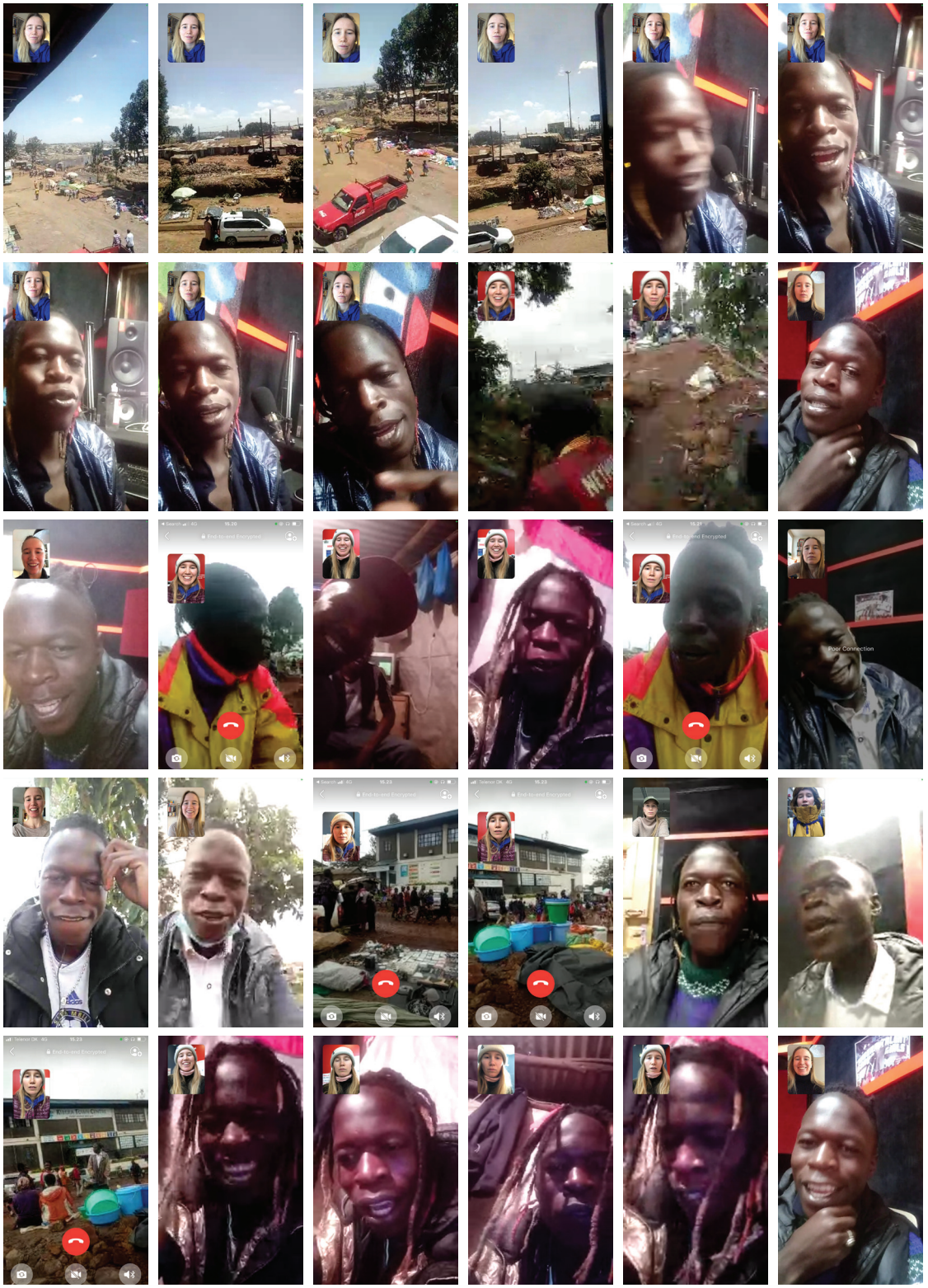
☪ Mosque

Process

The current conditions of COVID-19 have of course affected my initial plans to travel to Nairobi in February and I am still unsure if I will be able to visit the site later in the spring. This obviously has considerable consequences for how I am able to work with, and better understand the site. Fortunately, the current situation has also put me in contact with a lot of amazing people in Nairobi.

Through Whatsapp and Facetime Daniel 'Futwax' Owino Okoth, a musician, community leader and resident of Kibera is supporting me as a research assistant, conducting interviews, taking photos and sharing his own personal experiences with the project. The project will be developed in collaboration with Daniel, exploring the site through his eyes, stories and knowledge.

→ Screenshots from video call with Daniel Owino Okoth


Poor Connection

Deliverables

Main drawings

Mobility networks - exploring mobility strategies on an urban scale within and on the outskirts of Kibera.
(1: 10 000)

A public road - create new productive public spaces in the intersection of Missing Link 12 and Ali Jaden Road connected to new infrastructural systems.
(1:500)

Decentralised sanitation - designing a proposal for a new sanitation facility that also functions as a flexible community space.
(1:100 / 1:50)

UN Sustainable Development Goals

The project will focus on the following SDGs:

Goal 6: Clean water and sanitation

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

6.b
Support and strengthen the participation of local communities in improving water and sanitation management.

Goal 9: Industry, innovation and infrastructure.

9.1
Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.

Goal 11: Sustainable cities and communities.

11.2
By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons (UN, 2021).

← Ring Road Kilimani entering into Kibera (Brian Otieno)

CV

Education

Royal Danish Academy - Architecture
Bachelor & Master in Architecture
Urbanism and Societal Change
2015-2021

Culture Studies, Cape Coast, Ghana
University level
Environmental Studies
2014

Nyckelviksskolan, Stockholm
University level
General Art, Crafts and Design
2013-2014

L'Institut Catholique de Paris
University level
French language
2011-2012

Swedish School of Nairobi, Kenya
High School
Social science & international relations
2009-2010

Work experience

Aritekter Uden Grænser Danmark
Board member since May 2019

Aritekter Uden Grænser Danmark / Royal Danish Academy
January-September 2019
Junior architect & research assistant

SLA
January-December 2018
Junior architect, competition team

Exhibitions

70% Less - conversion to a viable age, Royal Danish Academy
September 2021
Semester project exhibited, collaboration with Inga Skjulhaug

Informal Horizons, Arkitekter Uden Grænser
September-October 2019
Organiser

AFRIKA: Rethinking Architecture, Royal Danish Academy
March-May 2018
Final bachelor project exhibited

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