NAVIGATING THROUGH PEAKS AND VALLEYS

Public space and water infrastructure as intervention tools for urban regeneration in Kigali, Rwanda

by
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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.
I understand that my thesis may be made electronically available to the public.

ABSTRACT

Current methods of urban regeneration, more specifically as practiced in Rwanda, are totally devoid of socially inclusive approaches, and highly lack contextual adaptability. In the aftermath of the genocide of 1994, which plundered the country's resources and human capita, Rwanda has undergone various states of reconstruction - socially, economically and architecturally. Over the past two decades, Kigali, Rwanda's capital city, has been building up its momentum of development towards translating itself into a dynamic urban hub, aiming at attracting foreign investors to boost the local economy. In 2007, the government adopted the Kigali Conceptual Master Plan, branding Kigali as a city of character, vibrant economy and diversity.[1] Since then, various alterations of the masterplan have been issued. Today, Kigali's skyline is dominated by steel, glass and concrete megastructures, in the image of 'modernity'.

However, these efforts at transforming Kigali into a city anchored on Western standards are completely disconnected from the current socio-cultural, ecological and economic dynamics. The masterplan promotes the annihilation of the informal areas within the city, which account for the dwelling area of 66% of Kigali's population.[2] It also dismisses the undulating topography and communal significance of Kigali's wetlands to informal dwellers. Consequently, the latter remain deeply vulnerable, constantly living under the fear of being evicted or relocated, while the wetland valleys, currently under serious ecological threat, are destined to be converted into parks reserved for the elite.

Through the critique of current methods and proposals of urban revitalisation, this thesis advocates for a more inclusive approach to urban planning, and promotes urban development lying in the interest of every strata of Rwandan society. The work dwells into how wetlands can be utilised as a backbone for urban revitalisation by optimising the potential of Kigali's watershed to provide adequate infrastructure that consolidates existing community relationships. The juxtaposition of ecology, infrastructure and architecture opens the possibilities for various patterns of incremental growth, while remaining sensitive to the social, environmental and cultural dimensions of the urban fabric.

The design strategy proposes a framework supporting enhanced livability based on the dimensions of society, economy, biodiversity, and sustainable development. The framework is explored through three nodes, each with its own specific challenges, and

1 Oz Architecture. 2007. *Kigali Conceptual Masterplan.* Kigali, Rwanda.

2 Ansoms, An, and Donatella Rostagno. 2012. "Rwanda's Vision 2020 halfway through: what the eye does not see." *Review of African Political Economy* 427-450.

focusses primarily on restoring water quality and wetland ecology through a decentralised, human-centric set of interventions. This work also showcases how the framework allows for continuous growth in the medium and long term, remaining in complete synchronisation with the altering dynamics of Kigali's emerging society. In contexts like Rwanda, where peace and conflict are sensitive and controversial matters, this thesis demonstrates how design can not only build communities and trigger tenacious social relations, but also how it can act as a gentle and subversive form of questioning the status quo.

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Figure 0.1: Children coming back from school in the Nyabugogo area.

dedicated to the truly rich ones;
those rich in humanity, those rich at heart

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INTRODUCTION

The events of the genocide of 1994, during which over 800,000 people were slaughtered in the span of 100 days, left Rwanda in a tragic state of ruin. Not only did the genocide pillage the physical and architectural infrastructure, the victims experienced loss of various levels: people lost loved ones, limbs, property, their dignity, and, to this day, Rwandans bear the physical and emotional scars of those events. The genocide ended in July 1994 when the Rwandan Patriotic Front (RPF) captured Kigali and declared a ceasefire. Since then, Rwanda's government has been led by the RPF, and has gradually been aiming at the reconstruction of a nation.[3]

Progressively building up on infrastructure grounded by the considerable support of foreign assistance, Kigali, Rwanda's capital city, has recently been subjected to a significant reshaping and transformation, and is now even lauded as 'Africa's cleanest city'.[4] By targeting and attracting foreign investors, Kigali aims at building up its economy, in conjunction with agricultural and industrial profits, and ultimately aspires at achieving the standards of a 'World Class City'. [5]

With a population of over 12 million for an area of 26,338 km^2, Rwanda is the second most densely populated country in the African region.[6] At a population growth rate of 2.46% over the past year[7], the country is currently facing some arduous challenges regarding inhabiting its exponentially expanding urban population. Kigali is currently at a stage where the rate of population growth has overly outweighed the provision of services, and where the rate of urbanisation exceeds economic growth. Informal settlements are in constant expansion and are well ingrained in the urban fabric: informal dwellers now constitute 66% of Kigali's population. [8]

As a solution to attenuate informality and to efficiently cater for the needs of this rapid urban expansion, a series of masterplans designed by American, Singaporean and Chinese firms

3 Burnet, Jennie E. 2012. Genocide Lives in Us - Women, Memory and Silence in Rwanda. Madison, Wiscons in: The University of Wisconsin Press.

4 Tshabalala, Sibusiso. 2015. *Kigali is "Africa's cleanest city," but that comes at a heavy price.* 24 September. Accessed October 29, 2017. https://qz.com/509948/kigali-is-africas-cleanest-city-but-that-comes-at-a-heavy-price/.

5 Ibid.

6 World Population Review. 2017. *Rwanda Population.* 27 October. Accessed October 29, 2017. http://world populationreview.com/countries/rwanda-population/.

7 Ibid.

8 Ansoms, An, and Donatella Rostagno. 2012. "Rwanda's Vision 2020 halfway through: what the eye does not see." *Review of African Political Economy* 427-450.

Figure 0.2 (previous page): Informal settlements draping over the hills of Kigali, overlooking the wetland valleys.

have been adopted over the last few years. *'Masterplan 2013', 'Vision 2020', 'Vision 2040'*, among others, all paint the picture of a new 'modern' Kigali, promoting sustainable and affordable development towards a city functioning according to 'global standards', and where environment conservation, public order and social harmony would be the dominating conditions.

However, scepticism has been manifested towards the plans, implying that they were designed according to elite-standards, without any consideration towards poverty reduction. With a substantial disparity constantly prevailing between the wealthy and the poor, the foreseeable aftermath of those proposed masterplans is the further widening of that gap, since the interest of the majority of the population is being disregarded.

Accelerated population growth and urbanisation, coupled with the propagation of informal settlements are often accompanied by environmental degradation. 24% of Kigali's surface area is composed of wetlands[9], where the presence of harsh pollutants and heavy metals is preponderant. Kigali's wetlands occupy a crucial cultural, economical and ecological role for the inhabitants and the city. Informal dwellers residing on the wetland edges rely on the latter for the growth of subsistence and commercial crops, livestock feed, fresh water, and plant-derived medicines.[10]

Over the recent years, enormous pressure has been exerted on the water and wetland resources through various emerging and increasing uses driven by the growing population, the intensification of agriculture, encroachment and pollution. Today, Kigali's wetlands and surrounding areas are faced with two main natural hazards: flooding and soil erosion. Flood events are mainly caused by faulty drainage and soil saturation, due inadequate activities in the wetlands. In addition, the quality of surface water present in the wetlands is deeply affected by polluted runoff and the impacts of inadequate waste disposal. [11]

In essence, this thesis aims at reconciliating the city with its intertwining ecology, as well as establishing the provision of clean water for informal dwellers and other social groups dependent on the wetlands' watershed. Part One begins with an analysis of the impacts of colonialism in Rwanda, and how 'divide and rule' policies bred conditions for an irreparable massacre. Part Two paints the fragile, and almost ephemeral idea of peace in pres-

9 REMA. Economic Analysis of Natural Resource Management in Rwanda. Kigali: Rwanda Environment Management Authority, 2006

10 Rwanda Environment Management Authority. 2018. "Detailed Sub-Catchment Management Plans for Gikondo and Nyabugogo Wetland Systems."

11 Ibid.

ent-day Rwanda, and eventually highlights the urge for an approach to design that unites the various classes of Rwandan society, as opposed to current divisive practices.

Part Three unfolds the current top-down master planning approach currently adopted by the government of Rwanda, and the associated controversies that this type of development brings about. The existing and emerging parallels between the formal and informal sides of Kigali are made evident in Part Four, where the social and communal dimensions of informal public space and wetlands are put on centre stage. The design framework illustrated through Part Five presents an approach to urban design that questions the customary practices, by presenting a network of decentralised, acupunctural interventions to re-establish the connections between the city, its people and its wetlands.

Ultimately, this thesis advocates for an approach that consolidates informal life, a life that is currently under serious threat, and susceptible to eradication. This thesis also shows that investment-driven urban development can happen in conjunction with a healthy informal fabric, by nurturing the cohabitation of both sides of the urban realm. The work presented through this thesis also explores the possible ways of supporting the tremendous potential of communities by applying design as a source of empowerment, towards a sustainable and durable evolution.

1

STATES OF CONTROL

1.1 Retracing the past

1.1.1 Pre-colonial era

Around 10,000 years ago, during the Neolithic period, the first inhabitants of what is now Rwanda settled in the land. Identified as the Twa tribe, they were hunter-gatherers inhabiting the forests, and were also engaged in the crafting of pottery. Between 400-1000 AD, migrants from Central Africa identified as the Hutu tribe settled on Rwandan land and were engaged in agriculture and small herds of livestock.[12] The last wave of migrants, known as the Tutsi tribe arrived between 1400 and 1500 AD, and were cattle herding pastoralists who were fleeing famine and drought from Central and East Africa. The aforementioned migrations did not occur through invasion and conquest, and all three tribes cohabited in peace. [13]

Until the 1600s, the Rwandan territory consisted of fragmented localities and independent tribes separated by hills. Prior to colonisation, the population of Rwanda was made up of three ethnic groups: the Tutsis, the Hutus and the Twa, the latter representing a very small minority as opposed to the previous two. Hutus and Tutsis were classified by class and clan and not by ethnicity.[14] Hutus were characterised as peasant cultivators, whereas Tutsis were cattle herders. Hutus also outnumbered Tutsis in a ratio of almost eight to one.[15] Wealth gained from cattle ownership helped propel the Tutsis into political power. Formerly established under the auspice of the first Mwami (king in Kinyarwanda) in the 1600s, the kingdom of Rwanda took its first step towards the centralisation of authority. In addition to a government, economic systems were created, notably the *Ubahake* and the *Ubukonde*[16]. The *Ubahake* led to a class-dominated system, instilling the Tutsis as a privileged minority and the Hutus as the working-class majority.[17]

By the late 1800s during the pre-colonial Rwandan era, class lines were certainly not blurred, but those living conditions were ones that were treated as the norm by the people of Rwanda, and everybody therefore abided by those rules in a harmonious manner.[18]

12 Uvin, Peter. 1999. "Ethnicity and Power in Burundi and Rwanda: Different Paths to Mass Violence." Comparative Politics (Comparative Politics, Ph.D. Programs in Political Science, City University of New York) 31 (3): 253-271.

13 Vansina, Jan. 2004. Antecedents to Modern Rwanda: The Nyiginya Kingdom. Wisconsin: The University of Wisconsin Press.

14 BBC. 2011. *Rwanda: How the genocide happened.* Accessed October 31, 2017. http://www.bbc.com/news/world-africa-13431486.

15 Ibid.

16 Barette, Timothy. n.d. "German Rwanda: The Overlooked Role of Germany in the Centralization of Authority in Rwanda from the 1890s-1919." *Academia.edu.*

17 Ibid.

18 Ibid.

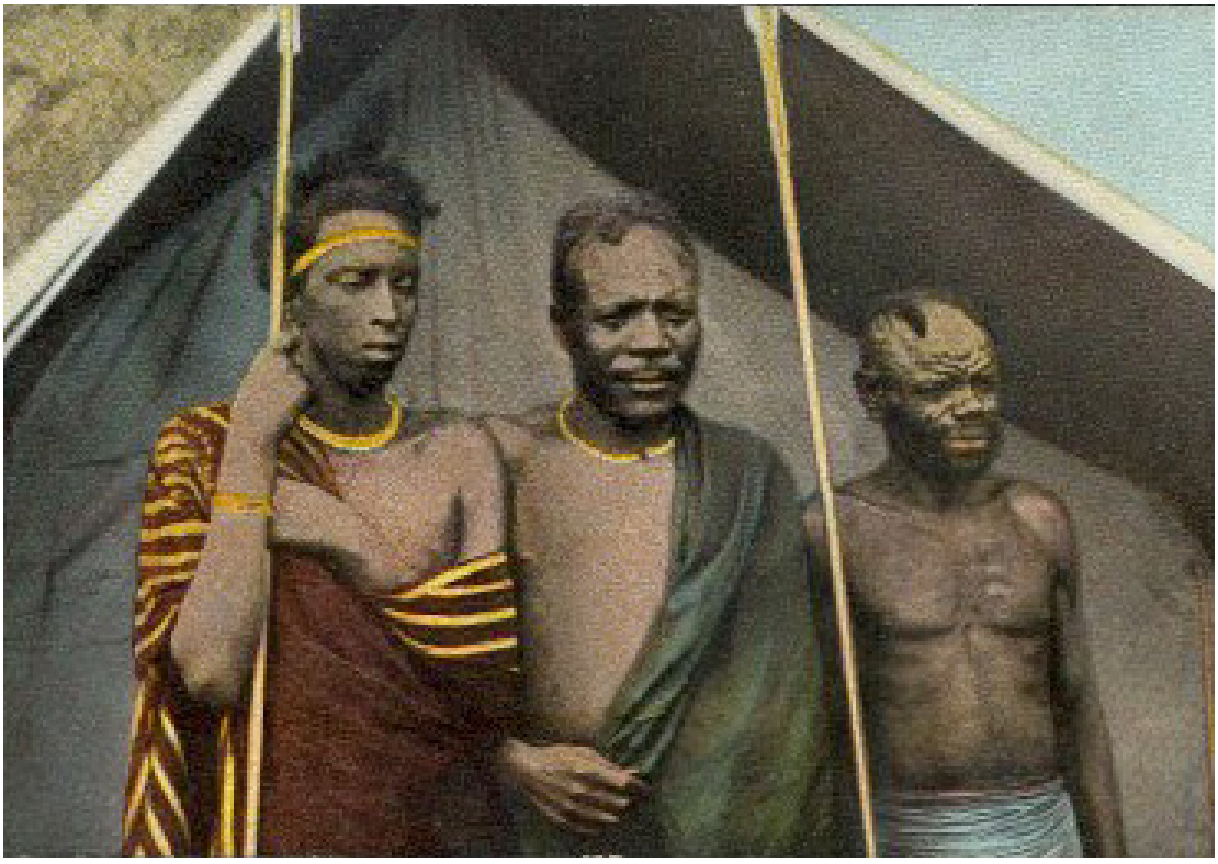

Figure 1.02: From left to right - Tutsi, Hutu and Twa chiefs cohabiting during pre-colonial era
Figure 1.01 (previous page): Informal dwelling marked to be demolished in view of the new masterplan

1.1.2 German and Belgian reign

During 19th century Imperialism, Germany settled into Rwanda in 1890, and totally re-appropriated the existing social structure which created major distinctions between the Hutu and Tutsi tribes. Due to their pre-colonial past as 'royalty' the Tutsis were considered as superior and 'elite'. Another reason for this assumption was also due to the fact that Germans recognised more Caucasian features in the Tutsis tribe, who hence, were more fit to rule.[19]

After the First World War, the rule over Rwanda was passed on from the Germans to the Belgians, and this saw the perpetuation of the trends already established by the Germans. The Belgians further exploited the Tutsi-Hutu division, lending military and political support to Tutsi leaders who maintained the policies of their colonial rulers and extensively controlled the country's resources and intuitions, to the detriment of their fellow Hutus. The 1920s saw the gradual loss of power of the Mwami, who eventually had to consult the colonial authorities before taking any decisions.

During the 1930s, the Belgians accentuated the divide by racialising Tutsi and Hutu identities. They set up a system which involved the formal identification of Hutus and Tutsis with official papers and identity cards - a system which accentuated the already prevailing socio-political tensions .[20]

1.2 Colonialism as a Genocidal Catalyst

1.2.1 Independence and the Genocide

In the early 1950s, Rwanda became a mandate under the United nations which granted the Hutu people more rights from the colonial authorities. The *Ubuhake* system was abolished and more Hutus occupied administrative positions. Local elections were held in 1953 for an advisory committee to the Belgian rulers. Since the representatives were indirectly elected by an electoral college made up of mainly Tutsi chiefs, less than 6 percent of the council was made of Hutu people, who knew that this under-representation would never give them equal rights in Rwanda. This eventually precipitated the resurgence of social tensions.[21]

In 1957, the Mwami presented a report to the UN decolonisation mission requesting independence from the Belgian authorities, and campaigning for the return of the pre-colonial system of the Tutsis ruling over the Hutus.[22] Feeling the upcoming threat, a group of Hutu intellectuals founded the Party for the Movement for Hutu Liberation (PARMEHUTU),

19 Burmeister, Katlyn. 2016. "European Colonialism Tied to the 1994 Rwandan Genocide." *Washington State University.*

20 Newbury, David. 1995. "Guest Editor's Introduction. Rwanda: Genocide and After." *Issue: A Journal of Opinion* 23: 4-7.

21 Mamdani, Mahmood. 2002. *When Victims Become Killers: Colonialism, Nativism, and the Genocide in Rwanda.* Princeton University Press.

22 Ibid.

Figure 1.03: Belgian rulers surrounded by their Rwandan allies, the Tutsi tribe.

Figure 1.04: Belgian officer controlling tribal identity

Figure 1.05: Example of an ethnic identification card

a party militating against colonialism and the national Tutsi elite. In 1959, violent conflicts emerged between the PARMEHUTU and the monarchist UNAR Tutsi party. The 1960 legislative elections saw the win of the PARMEHUTU and the fall of the Tutsi monarchy, causing a considerable portion of the Tutsi people to flee the country.[23] The Belgian authorities were powerless against this wave of violence, and sensing an upcoming tragedy, the Belgian colonisers shifted in favour of the Hutu majority before eventually granting Rwanda its independence in 1962.[24]

Ethnic tensions were still prevalent, and Rwanda experienced a civil war that lasted from 1990 to 1993, as a result of an invasion of Tutsis that previously fled to neighbouring countries. The assassination of Hutu President Juvénal Habyarimana in 1994 caused the upheaval of the Hutu majority, and eventually led to what some scholars define as 'one of the most catastrophic human disaster in history'.[25]

The mass killings rapidly proliferated from Kigali to the rest of the country, strongly sustained by local officials and government-sponsored radio stations which encouraged civilians to murder their neighbours. The Hutu extremists engaged in a ruthless massacre of the Tutsi "cockroaches" and other Hutus who were trying to oppose their force. Those events also saw the UN giving up on its duties by withdrawing its troops from its peacebuilding force in Rwanda, and the international community, through minimal timid interventions, remained on the side-lines. [26]

Rwanda witnessed a situation where the oppressed became the oppressors: 100 days of horrific massacre invaded the whole country. People were massively killed in cold blood, grenades ravaged villages and gasoline was used to burn down neighbourhoods. The genocide was put to an end when in July 1994, Kigali was captured by the Rwandan Patriotic Front who eventually took over power in Rwanda, with Paul Kagame as their leader. These events were followed by the fleeing of more than two million Hutus to the Democratic Republic on Congo and Tanzania. [27]

While the ethnic class system has now been completely abolished, the scars of this disaster still remain.

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23 Ibid.

24 Newbury, M. Catharine. 1983. "Colonialism, Ethnicity, and Rural Political Protest: Rwanda and Zanzibar in Comparative." *Comparative Politics Vol 15 No 3* 253-280.

25 Newbury, David. 1995. "Guest Editor's Introduction. Rwanda: Genocide and After." *Issue: A Journal of Opinion* 23: 4-7.

26 Cowell, Alan. 2014. "Colonialism, Bloodshed and Blame for Rwanda." *New York Times*

27 Mamdani, Mahmood. 2002. *When Victims Become Killers: Colonialism, Nativism, and the Genocide in Rwanda.* Princeton University Press.

Figure 1.06: President Habyarimana and President Francois Mitterand parading in the streets of Kigali, 1990

Figure 1.07: Hutu rebels patrolling the streets post-independence

1.2.2 RPF in power and military conflicts in the Democratic Republic of Congo

The massive convergence of refugees towards the Democratic Republic of Congo (previously called Zaire), notably into the Kivu province, created considerable internal disruptions. There was a constant frustration among Hutu outlaws who perceived enemies everywhere, as they were hunted down by the Tutsi armed forces affiliated with the RPF. Congolese civilians, who had nothing to do with the conflict, found themselves caught up in the middle of this violence which in turn caused an increased militarisation of life in Kivu. This eventually led to the First Congo War when the RPF invaded the country and looted Congo of its national mineral resources, to the benefit of Rwanda.[28]

The wars between Rwanda and Congo are referred to as the First and Second Congo wars, and lasted from November 1996 to May 1997, and from August 1998 to July 2003 respectively. As a result of those wars, around 5.4 million people were reported to have died by 2004. [29]

1.3 Post Cataclysm: lineaments of the Genocide

"To find evidence of that period, you have to look into the hearts of the people where those memories lie buried." [30]

Indeed, the physical traces of the events of 1994 are faintly present in Rwanda's landscape. The very few physical remains are some churches, the prisons, predominantly the Nyarugenge Prison in Kigali, and some ex-penitentiaries. While the genocide did completely annihilate the physical, architectural, infrastructural and emotional resources of Rwanda, the whole country has invested tremendous effort towards producing a brand new urban and rural realm, paying specific attention to wipe out most of traces of the genocide as a result of the RPF coming to power.[31]

Dealing with the perpetrators of the genocide was indeed a very tedious matter to tackle due to the mass participation of the civilian population. The Rwandan government hence decided to set up make-shift courts, called Gacaca courts to ease community-in-

28 Mamdani, Mahmood. 2002. *When Victims Become Killers: Colonialism, Nativism, and the Genocide in Rwanda.* Princeton University Press.

29 Ibid.

30 Gwin, Peter. 2014. "Rwanda: The Art of Remembering and Forgetting." *National Geographic.* Accessed November 05, 2017. https://news.nationalgeographic.com/news/2014/04/140407-rwanda-genocide-today-anniversary/.

31 Mamdani, Mahmood. 2002. *When Victims Become Killers: Colonialism, Nativism, and the Genocide in Rwanda.* Princeton University Press.

spired justice against the perpetrators of the genocide. By 2007, 818,564 people had been tried and accused of various crimes in the Gacaca courts.[32]

The Genocide Memorial Centre, located in the heart of Kigali, is the main container of various archives and artifacts reminiscent of the tragic events. Few other memorial sites can be found across the country, as indicated on the map below.

It is important to remember that, despite very few physical remnants of the genocide being present in Rwanda today, Rwandans, on the other hand, still bear the trauma of those dramatic events. The next section illustrates how recent efforts deployed by the state to meticulously erase most physical traces of the genocide are part of a bigger mechanism of control that exploits fear and trauma towards a better manipulation of society's perception.

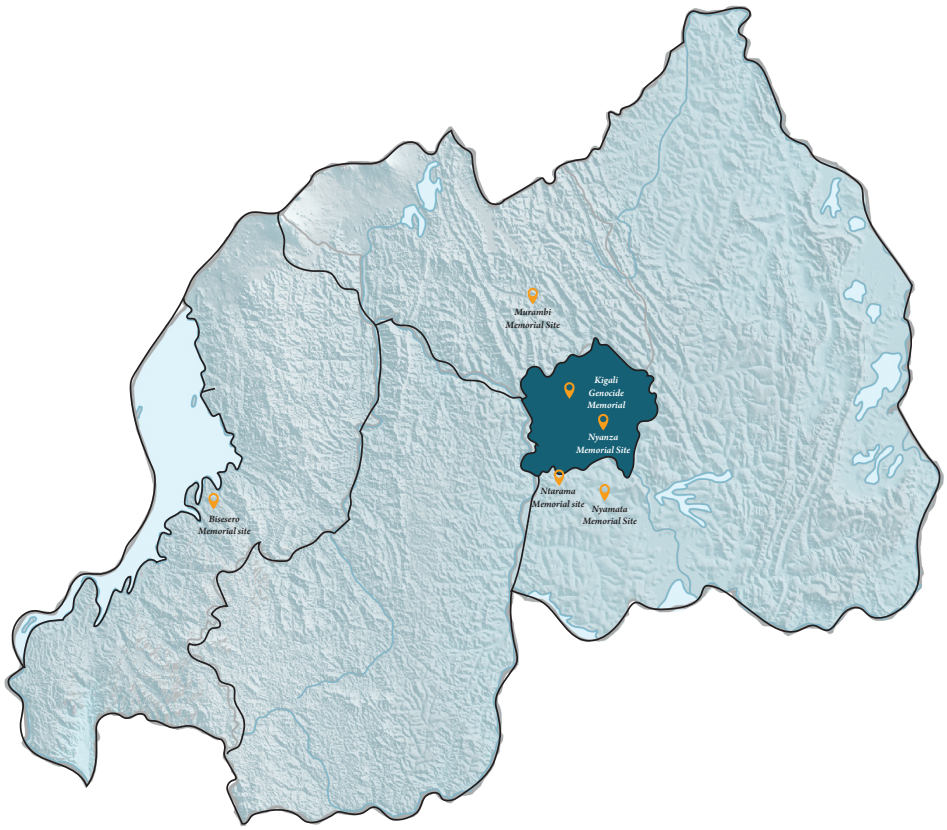
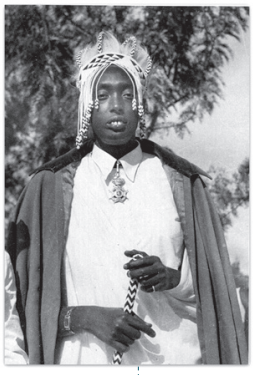


Figure 1.08: Map of remaining Genocide memorials

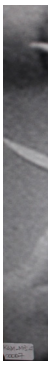
32 Ingelaere, Bert. 2008. "Traditional Justice and Reconciliation after Violent Conflict: Learning from African Experiences." In *Traditional Justice and Reconciliation after Violent Conflict: Learning from African Experiences*, 40. International Institute for Democracy and Electoral Assistance.

modern-day Twa pottery crafters

Tutsi Mwami



Tutsi Mwami



10,000 BC - Neolithic Period
Twa settle in Rwanda

hunter-gatherers and pottery crafters

400 to 1000 AD -
Hutus settle in Rwanda

engaged in agriculture and small herds of livestock

1400 to 1500 AD -
Tutsis settle in Rwanda

cattle herders

1600s - first Tutsi Mwami (king) is established

authority is centralised

late 1800s: Tutsi rule is rooted in the social strata

Hutu considered as the working class majority

1890 - Germany settles in Rwanda

Tutsis were viewed to possess more Caucasian features and to be more fit to rule

Germans accentuated the divide between Tutsis and Hutus

1920 -
Belgians take over the rule of Rwanda

1920s -
colonial authorities take power over the Mwami

1930
Tutsi

territory divided into fragmented localities and independent tribes

1600s

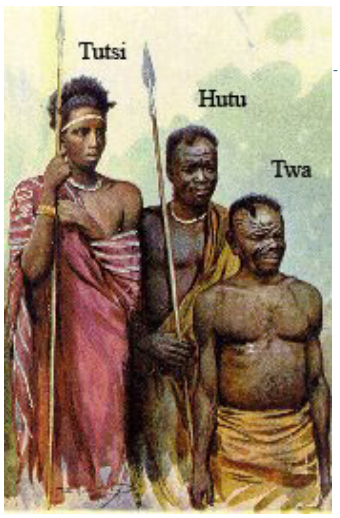
Tutsis, Hutus and Twas make up the ethnic composition

Twa: minority

Tutsi: political power

Hutu: majority

through wealth gained from cattle herding

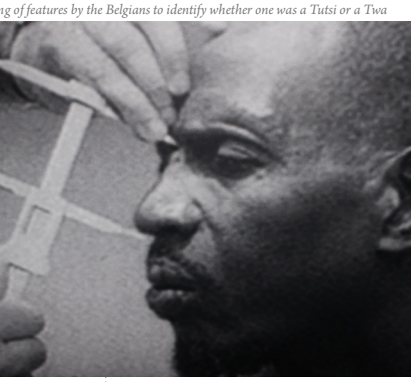


tribal distinctions between Tutsis, Hutus and Twas

Tutsis fleeing Rwanda

Figure 1.09: Political timeline of Rwanda

ng of features by the Belgians to identify whether one was a Tutsi or a Twa



Rwanda's independence day 1962

Second Congo War

s - Belgians racialise and Hutu identities

1950s - Hutus granted more rights from the local authorities

1960 - victory of PARMEHUTU over UNAR

Tutsis started to flee the country

1962 - accentuated tensions and Hutu domination

Rwanda acquires independence

1990 to 1993 - Rwandan Civil War

6 April 1994 - Hutu president Juvénal Habyarimana is assasinated

7 April 1994 to 15 July 1994 - Genocide occurs

15 July 1994 - Paul Kagame and his RPF capture Kigali and declare ceasefire GENOCIDE ENDS

July 1994 - Hutus fleeing to Congo and Tanzania

Hutus creating disruptions in Congo, hunted by Congolese Civilians and RPF troops

November 1996 to May 1997 - First Congo War

August 1998 to July 2003 - Second Congo War

2000 - Paul Kagame becomes the President of Rwanda

2007 - over 800,000 tried and accused of various crimes in Gacaca courts

2017 - Kagame is re-elected to remain in office until 2034.

President Juvénal Habyarimana

trial in Gacaca courts

genocide remains at Ntrama Church

President Kagame at his re-election in 2017

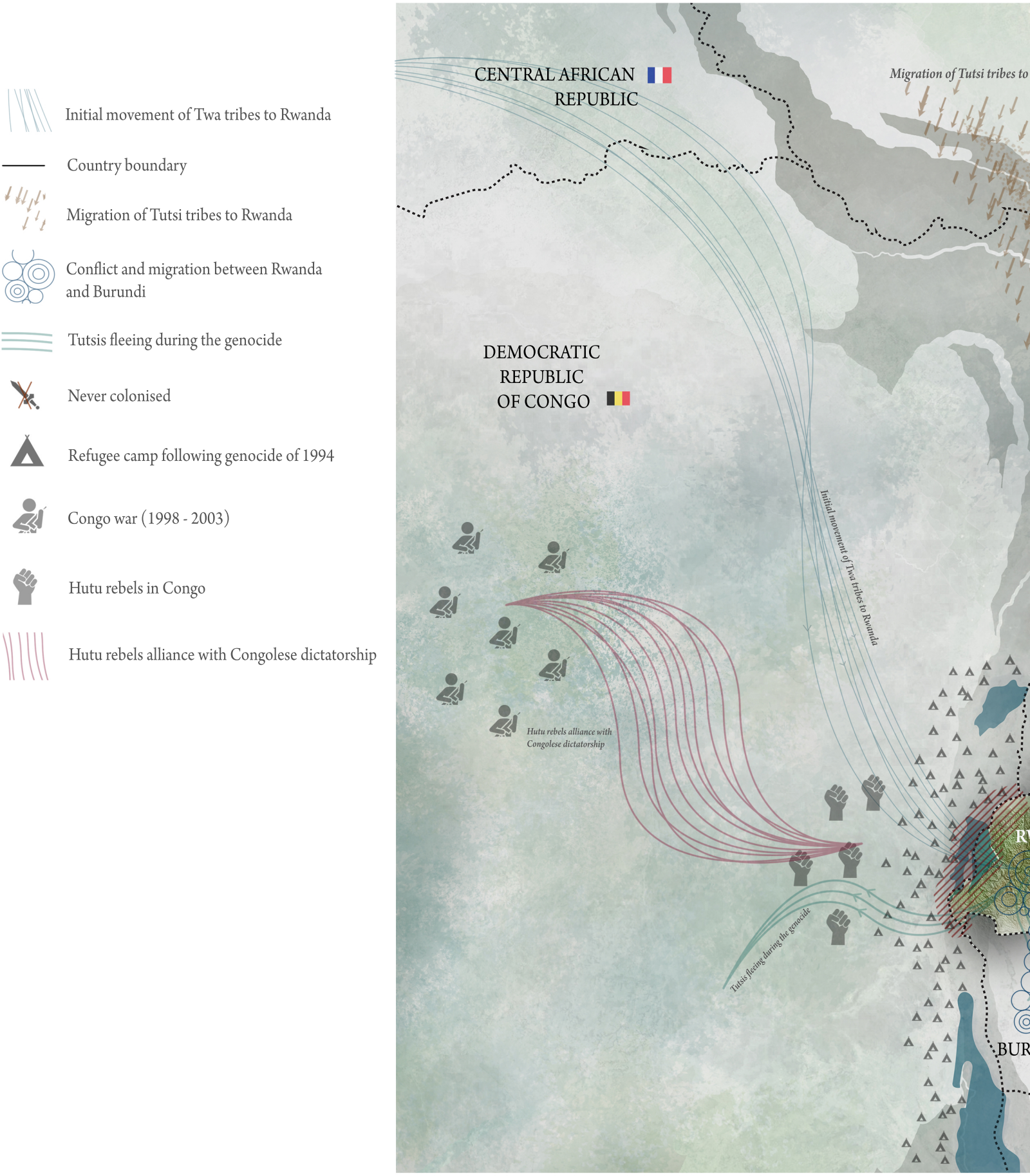
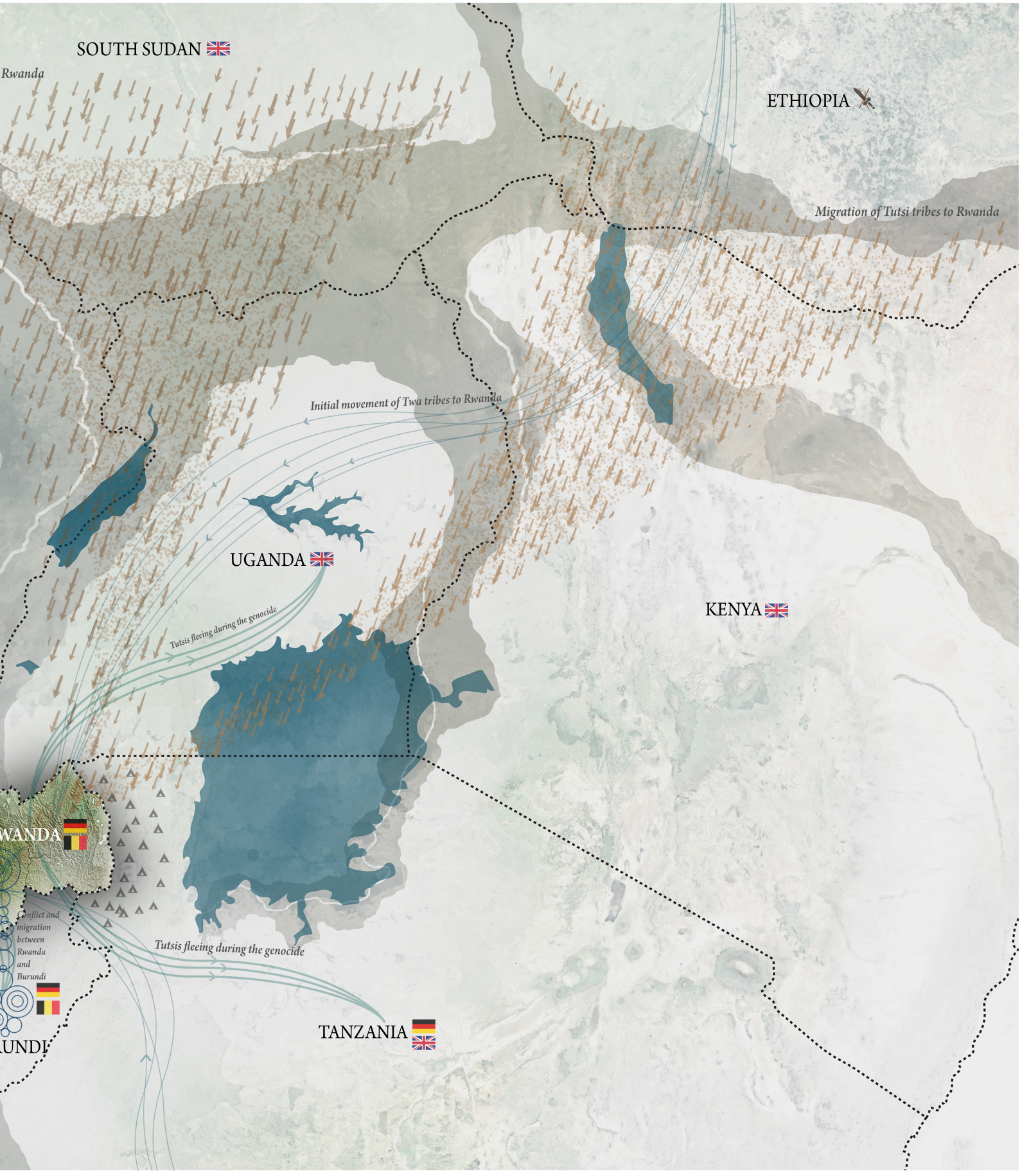


Figure 1.10: Geopolitical and demographic map of Rwanda and surrounding regions


SOUTH SUDAN
Rwanda
ETHIOPIA
Migration of Tutsi tribes to Rwanda
Initial movement of Twa tribes to Rwanda
UGANDA
KENYA
Tutsis fleeing during the genocide
WANDA
Conflict and migration between Rwanda and Burundi
Tutsis fleeing during the genocide
TANZANIA
UNDI

2

‘PEACE’

To this day, Rwandans still do not seem ready to talk openly about the events of April 1994. They also present an attitude of acceptance and passivity towards their surroundings, and any development that might affect it. Or at least, they are extremely hesitant to voice out their disagreement, most probably due to the fear of creating turmoil, which they associate to the irreversible events of the past.

The teachings of Rwandan history through time have been deeply altered to only convey a message of national unity.[33] Any historical period that included internal conflict and division was underplayed in historical teaching.[34] Over time, the political language also changed and today, one can no longer speak of Hutu or Tutsi identity without causing controversy, as those identities have now been completely eradicated. The prevailing current context in Rwanda is one where violence and conflict are totally forbidden from the common discourse, and where critical thinking and questioning the status quo are matters that are totally out of bounds from the Rwandan population.[35]

2.1 Surveillance

Due to its turbulent past, Rwanda is today a state upon which total control is exerted. Although not actively visible, a perpetual fear of conflict is prevalent in contemporary Rwandan society. Three main patterns constantly recur in the people's behaviour and mindset. Firstly, talking about the genocide makes people very uneasy, it is a topic that is better avoided. Second, asking whether one is a Hutu or Tutsi is extremely taboo, and lastly, Rwandans have now adopted a totally opposite attitude towards rebellion and violence: they agree with everything and question nothing.

Kigali, Rwanda's capital city, is indeed very safe. It is even promoted today as one of the safest cities in Africa.[36] One of the main reasons of this is the permanent surveillance that is exerted across the city. Within every kilometre, one can find heavily armed police forces patrolling the streets to maintain constant law and order.[37] These imposing figures,

33 Buckley-Zistel, Suzanne. 2009. "Nation, narration, unification? The politics of history teaching after the Rwandan genocide." Journal of Genocide Research 31-53.

34 Ibid.

35 2017. Rwanda: The right of freedom of expression and of free media remains in jeopardy. December 4. Accessed June 23, 2018. http://www.jambonews.net/en/news/20171204-rwanda-the-right-of-freedom-of-expression-and-of-free-media-remains-in-jeopardy/.

36 Tshabalala, Sibusiso. 2015. *Kigali is "Africa's cleanest city," but that comes at a heavy price.* September 24. Accessed October 29, 2017. https://qz.com/509948/kigali-is-africas-cleanest-city-but-that-comes-at-a-heavy-price/.

37 Ibid.

Figure 2.02: Permanent surveillance of armed RDF soldiers within approximately every kilometre

Figure 2.01 (pages 18-19): City cleaner ensuring that the policy of cleanliness is correctly enforced within Kigali

Figure 2.03: The moto-taxis are an example of an informal job sector that was eventually formalised by the government for better safety and monitoring. They are the eyes and ears of the city.

constantly on the lookout, surely shy away any act of insurgence.

Furthermore, the moto-taxis are an example of an informal job sector that was eventually formalised by the government for better safety and monitoring. Since they operate at the corner of every street, they are the eyes and ears of the city, and unknowingly form part of the mechanism of control and surveillance.[38]

2.2 Divide and rule

Rwanda, as many other nations in the likes of India and Cyprus, saw their civilisations torn apart by their colonisers through the 'divide and rule' policy.[39] It is evident that this strategy, previously employed by colonisers, is passively being mirrored onto today's context, where social segregation is continuously escalating. Kigali's topography distinctly displays this gradient of social stratification: the formal business and administrative areas are repeatedly located on the hill-tops, then gradually fade into informality, and finally into the degraded wetland valleys.

The urban developments currently proposed by the state will only serve to accentuate these divisions, since the latter is strongly advocating for the inflation of business districts, as well as high-end residential and commercial areas. All this to the great detriment of informal dwellers, who are under the constant threat of eviction or relocation to remote areas on the outskirts of the city. Citizens living in informality have absolutely no say about their fate and are forced to surrender to a given predetermined course.[40]

Achieving a society where the upper class is satisfied with their lavish comfort, and where the majority of the population feels oppressed and alienated seems to be the state's objective. Through this strategy, it ultimately becomes easier to exert extensive power over the population, with an unrestricted authority to rule without reserve.

2.3 Cleanliness

The state is also greatly adamant to cleanliness and even set up a system, called the Umuganda, where on the last Saturday of the month, it is mandatory for every single

38 Goodfellow, Thomas. 2016. Politics on two wheels: motorcycle taxis and divergent development in Rwanda and Uganda. February 17. Accessed March 8, 2018. http://africanarguments.org/2015/02/17/politics-on-two-wheels-motorcycle-taxis-and-divergent-development-rwanda-and-uganda-by-tom-goodfellow/.

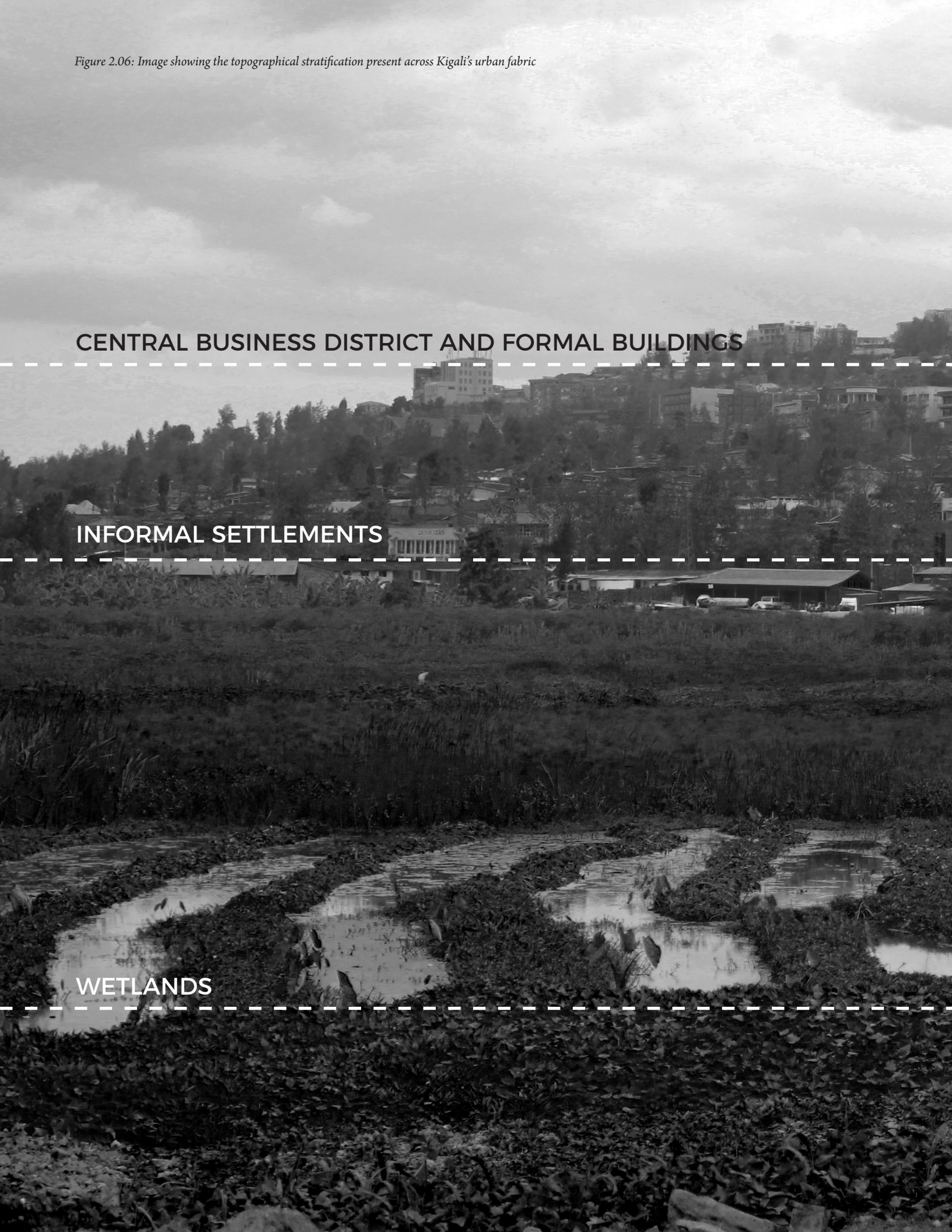
39 Stewart, Neil. 1951. "Divide and Rule: British Policy in Indian History." Science and Society 15 (1): 49-57

40 Benken, Emily E. 2017. "Nowhere to go : informal settlement eradication in Kigali, Rwanda." College of Arts & Sciences Senior Honors Theses.

Figure 2.04: Umuganda - Rwanda's community work day.

Figure 2.05: Municipal cleaners can be seen all throughout Kigali ensuring cleanliness of the roads and all public areas. The cleaners are most frequently spotted in areas occupied by the upper and upper-middle classes, as opposed to informal settlement and other areas occupied by lower classes of society.

Figure 2.06: Image showing the topographical stratification present across Kigali's urban fabric



Rwandan to get out on the streets to clean and demonstrate care for their country.[41] While this is an admirable initiative towards cultivating civic duty and community belonging, this commitment to cleanliness goes beyond being a simple monthly task.

Indeed, this obsession with sterility is not limited to the urban fabric, it is applied to urban dwellers as well. As mentioned previously, the eradication of informal settlements seems to be the primary objective towards achieving a new, modern, Kigali. This segment of society, considered far too unproductive for the state's capitalistic vision, is being completely discarded to nothingness. Furthermore, in response to the prevailing degraded state of Kigali's wetlands, urban regeneration proposals advocate for an elite-favoured approach through glossy, pristine wetland parks, without any consideration for the relationships currently existing between the informal dwellers and the wetlands.[42] Altogether, there seems to be a compulsion towards achieving a spotless and unblemished urban fabric, both on the physical and social level, with the aim of showcasing the fictitious image of a nation devoid of social inequalities, a nation nearing perfection.

Elizabeth F. Schwartz describes the idea of 'social cleansing' as an urban phenomenon where the victims belong to a marginalised socio-economic class and are perceived by the aggressors to be dangerous and unfit to participate in society.[43] Social cleansing happened during the genocide on an ethnic and political basis, but also on a highly more dramatic level. Today, however, economic reasons seem to drive the urge for a 'pure and clean' society, and again demonstrate how contemporary governing practices embody mechanisms reminiscent of the past.

2.4 Propaganda

Propaganda is still growing strong into convincing not only locals, but the entire world, that Rwanda is doing great and that all the endeavours of the state are solely towards the betterment of the country. At the commands of this operation of propaganda is the state-affiliated newspaper, The New Times, which never fails to display the government's commitment to the nation, as well as overemphasising Rwanda's exploits, both on the national and international scene.

In 2000, Paul Kagame officially became the President of Rwanda. Since his acquisition of power, Rwanda has surely gained some momentum towards progress. The country

41 Yee, Amy. 2018. How Rwanda Tidied Up Its Streets (And The Rest Of The Country, Too). July 18. Accessed August 1, 2018. https://www.npr.org/sections/goatsandsoda/2018/07/18/628364015/how-rwanda-tidied-up-its-streets-and-the-rest-of-the-country-too.

42 City of Kigali. 2013. "Kigali City - Master Plan Report."

43 Schwartz, Elizabeth F. 1995. "Getting Away with Murder: Social Cleansing in Colombia and the Role of the United States." *The University of Miami Inter-American Law Review* 27 (2): 381-420.

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'Rwanda is like a pretty girl with a lot of makeup, but the inside is dark and dirty'

With Paul Kagame set for a landslide victory in Friday's election, Diane Rwigara, a fierce critic of the Rwandan president, is challenging his human rights record

Figure 2.07: Article from The Guardian, 4th August 2017, relating to the dark side of what happens behind closed doors in Rwandan politics

Kigali 2020: the politics of silence in the city of shock

THOMAS GOODFELLOW 14 March 2013

The Rwandan government have ambitious yet deeply disruptive plans to rebuild Kigali as Africa's Singapore. Despite plans to uproot vast swathes of the city to make way for 'virtual Kigali', the response by ordinary city-dwellers has been one of striking silence.

Few governments in Africa have been as ambitious as Rwanda's when it comes to thinking about their urban future. To anyone who knows the country, this intensity of ambition should come as no surprise. Rwanda's 'Vision 2020' strategy paints a picture of a middle-income country in the year 2020: a regional economic powerhouse serving as an ICT, finance and logistics hub for the region. At the heart of this vision sits Kigali, the sparkling future-city linking Africa's Indian Ocean coast to the tumultuous, war-torn interior of the continent with its thwarted potential and largely untapped markets.

Figure 2.08: Article from Open Democracy, 14 March 2013, about the harsh realities on current urban developments in Kigali

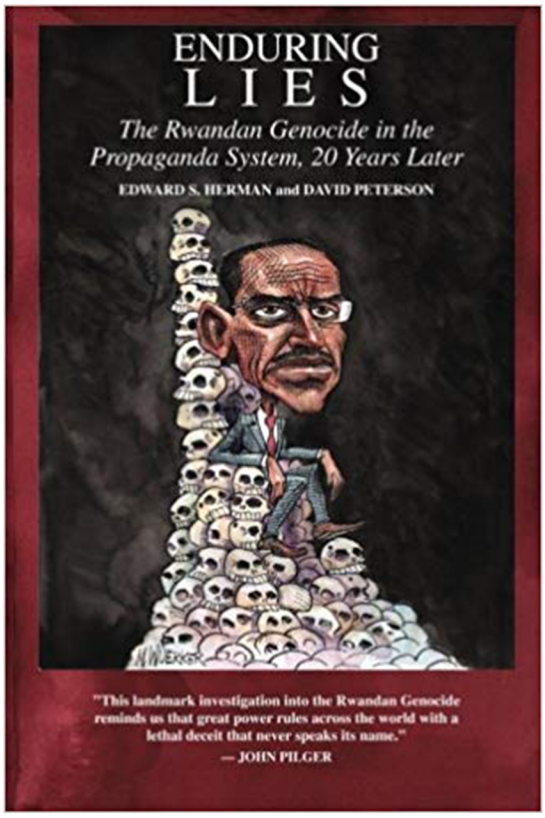

Figure 2.09: Cover of the book 'Enduring Lies' by Edward Herman and David Peterson(2014), demonstrating the image of Rwandan politics on the international scene

was lauded for its impressive Growth Domestic Product (GDP) increase of 8% in 2005; yet, Rwanda has had limited success in its human development and poverty reduction programs.[44]

Paul Kagame is himself a practitioner of authoritarian propaganda.[45] Over the years, he has been able to earn the blind trust of the majority of the nation by establishing over-simplified problems, to which only he claims to have a solution. As a result, he managed to amend to the constitution, which enabled him to run for elections again in 2017, and remain in office until 2034[46]. Even though Kagame is seen as a the 'protector' of the people, echoes of what happens behind closed doors relate a totally different story. David Himbara, a former economic aide to Kagame who fled to Canada and sought asylum, said Kagame "is a dictator who doesn't simply see violence as a means to an end, but openly delights in it."[47]

Thus, through propaganda – radios, newspapers, false promises and an exalted discourse – the state restricts both people's actions and thought process. At first sight, Rwanda looks very peaceful, but when one starts scratching the surface, one uncovers a truth that not only disunites, but also enhances segregation, poverty and frustration among the inhabitants. *'Everything is good here'* Rwandans say, but after engaging with the youth, one only realises that they secretly yearn for a better life, away from their motherland, where they could finally prosper socially and financially.

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44 Booth, David, and Frederick Golooba-Mutebi. 2012. "Developmental patrimonialism? The case of Rwanda." *African Affairs* 379-403.

45 Surana, Kavitha. 2017. *Even Critics of Rwanda's Government Are Helping Paul Kagame Stay in Power.* August 3. Accessed July 29, 2018. https://foreignpolicy.com/2017/08/03/even-critics-of-rwandas-government-are-helping-paul-kagame-stay-in-power-election/

46 Ibid.

47 Ibid.

The New Times RWANDA'S LEADING DAILY

News Opinions Sports Lifestyle Events TimesTV Jobs & Tenders

EDUCATION

What makes Rwanda's development journey enviable

Most people worldwide back in the day knew Rwanda as the country that experienced the terrible 1994 genocide against the Tutsi. But today, they not only know it as an African country that has not only recovered from its scars caused by the Genocide, but also one that has made astronomical strides in its development agenda.

By Peterson Tumwebaze Published : December 13, 2017

Figure 2.10: Article from The New Times, 2nd January 2018, about the exploits of Rwanda in terms of development

The New Times RWANDA'S LEADING DAILY

News Opinions Sports Lifestyle Events TimesTV Jobs & Tenders

LETTERS

Kigali will become a great city soon

Editor, Allow me to respond to a letter published in The New Times under the headline "Kigali on course to become a great city" (The New Times, July, 13). Let us all support Kigali City Council and the government in general to make Kigali a great city.

By Peterson Tumwebaze Published : August 02, 2012

Figure 2.11: Article from The New Times, 2nd August 2012, about the exceptional promises to achieve greatness in Kigali

The New Times RWANDA'S LEADING DAILY

News Opinions Sports Lifestyle Events TimesTV Jobs & Tenders

NEWS

FEATURED: An insight into how Infrastructure in Rwanda is transforming lives and boosting the economy

Published : May 18, 2018 | Updated : May 21, 2018

Figure 2.12: Article from The New Times, 21st May 2018, convincing its readers of the economical miracles accomplished in Rwanda

3

SMOKE AND MIRRORS

Figure 3.01 (page 30):Modern structure recently erected in Kigali's Central Business District

3.1 Unfolding Kigali

Today, Kigali has completely broken away from its state of destruction. Rwanda's capital has been growing at an extremely fast pace over the course of the past twenty years. This escalation of urbanisation manifests itself both through population and infrastructural expansion. The population of Kigali is currently estimated at 1.1 million and is projected to expand exponentially over the course of the next few decades[48].

Located in the central part of Rwanda, the city of Kigali is concomitant with the province of Kigali. The latter is divided into three administrative districts: Nyarugenge, Kicukiro and Gasabo.[49] The land-use map of the province of Kigali shows the extensive practice of agriculture which occupies over 64% of the land area, and the sprawling residential zones across the city.[50]

The outlines and contours of Kigali are carved by the sloping terrain on which the city dwells, giving Kigali a unique topographic character. Kigali lies between the two mountains of Mount Kigali and Mount Jali. The main river running through the city is the Nyabugogo river, which flows south from Lake Muhazi, before joining the Nyabarongo river.[51] Rwanda's capital is dominated by its landscape, with wetlands, water bodies, forests, steep hills and other natural elements covering 24% of its surface area, highlighted in green on the map.[52]

Due to its rapid expansion, Kigali's topography is draped by informal settlements, housing 66% of the city's population.[53] The informal economy is therefore a very substantial one, where the average middle-income earner making less than two Canadian dollars a day.[54]

The correlation between Kigali's informal settlements, watershed and wetlands is an important aspect that shall drive the strategy presented through this thesis, and that shall be elaborated in further details in Chapter 4.

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48 National Institute of Statistics of Rwanda. 2018. *Kigali Population Data.*

49 City of Kigali. 2013. "Kigali City - Master Plan Report."

50 Ibid.

51 Rwanda Environment Management Authority. 2013. "Kigali. State of Environment and Outlook Report." https://na.unep.net/siouxfalls/publications/Kigali_SOE.pdf.

52 Ibid.

53 Ansoms, An, and Donatella Rostagno. 2012. "Rwanda's Vision 2020 halfway through: what the eye does not see." *Review of African Political Economy* 427-450.

54 Benken, Emily E. 2017. "Nowhere to go : informal settlement eradication in Kigali, Rwanda." *College of Arts & Sciences Senior Honors Theses.*

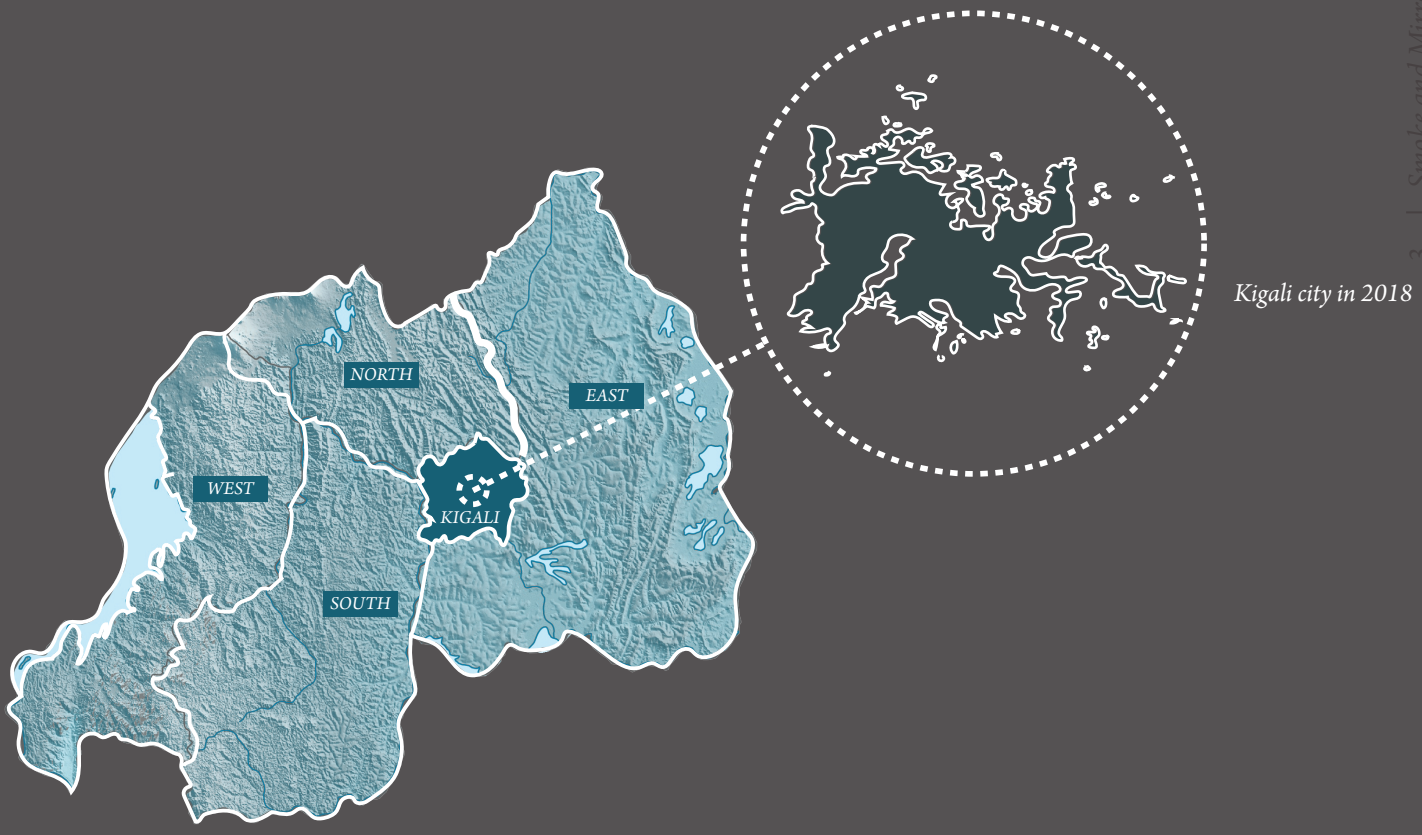


Figure 3.02: Map of Rwanda, indicating the updated division of provinces since 2006, and locating the City of Kigali

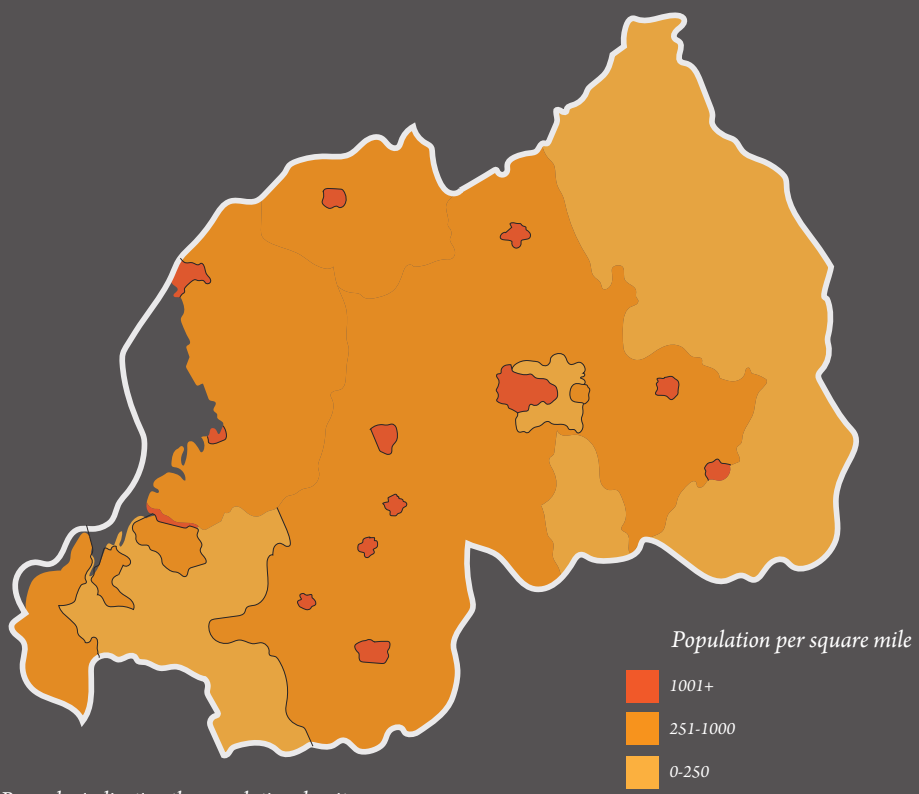


Figure 3.03: Map of Rwanda, indicating the population density throughout the country

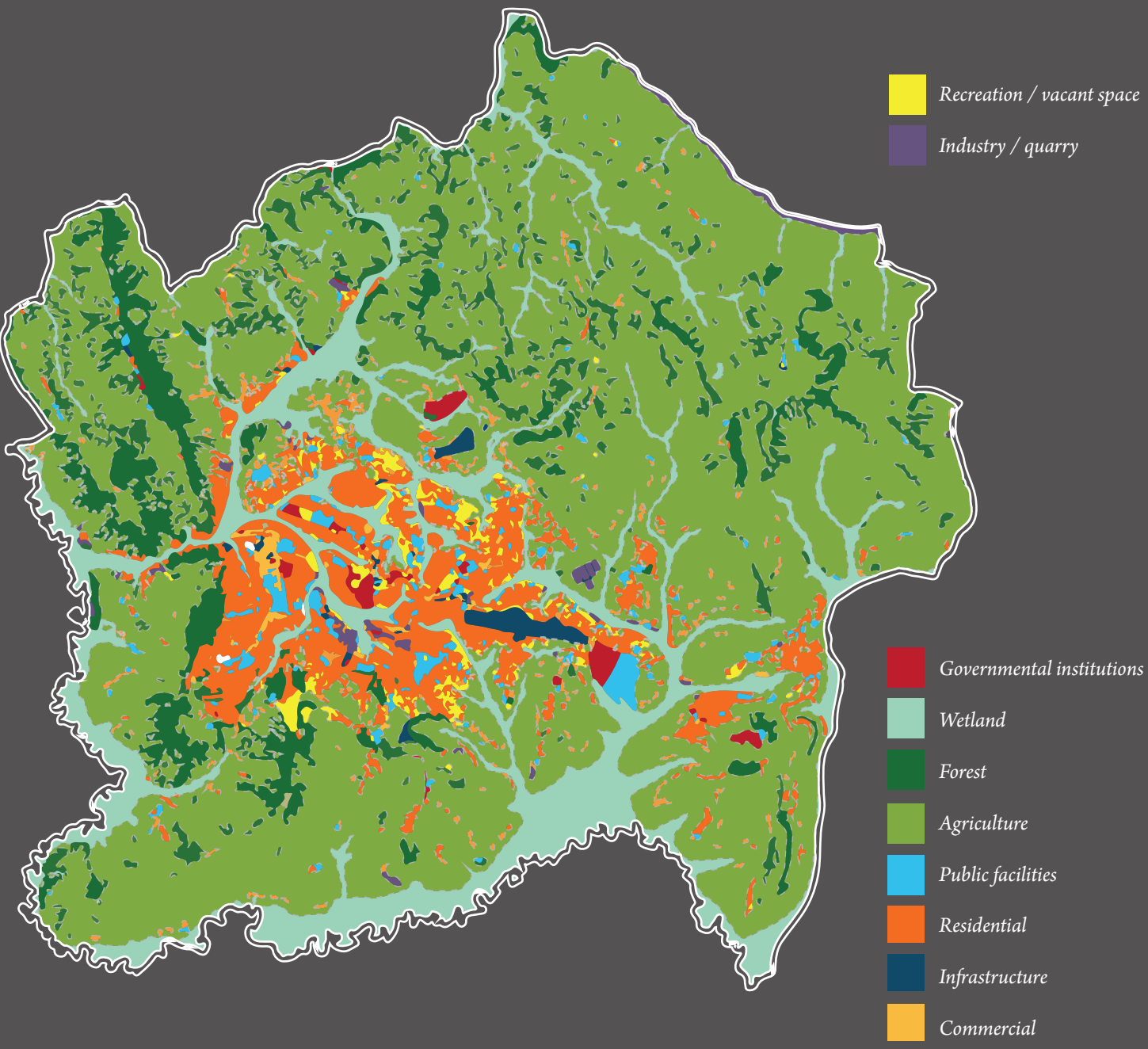


Figure 3.04: Land use map of the province of Kigali

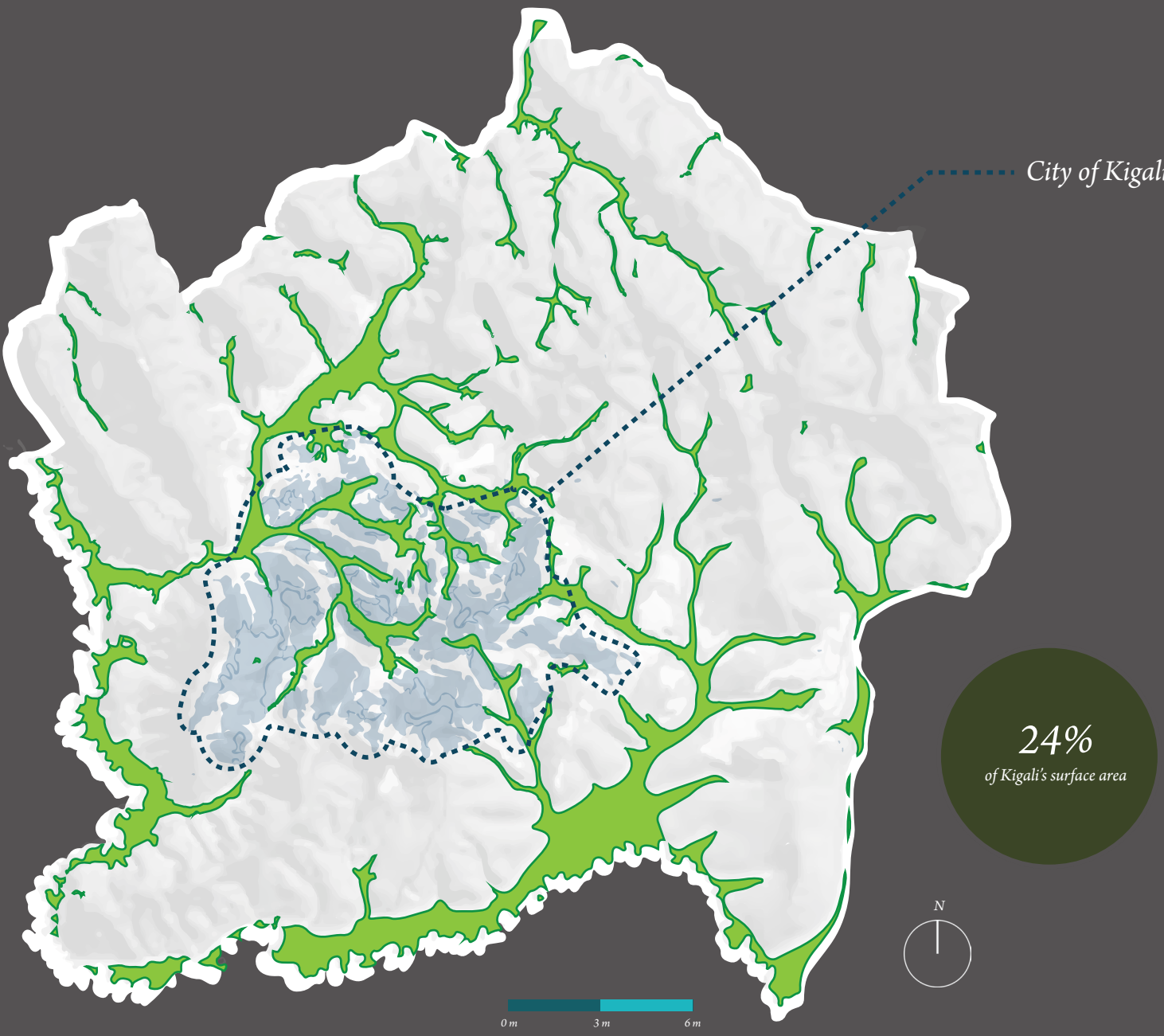


Figure 3.05: Wetland map within the province of Kigali

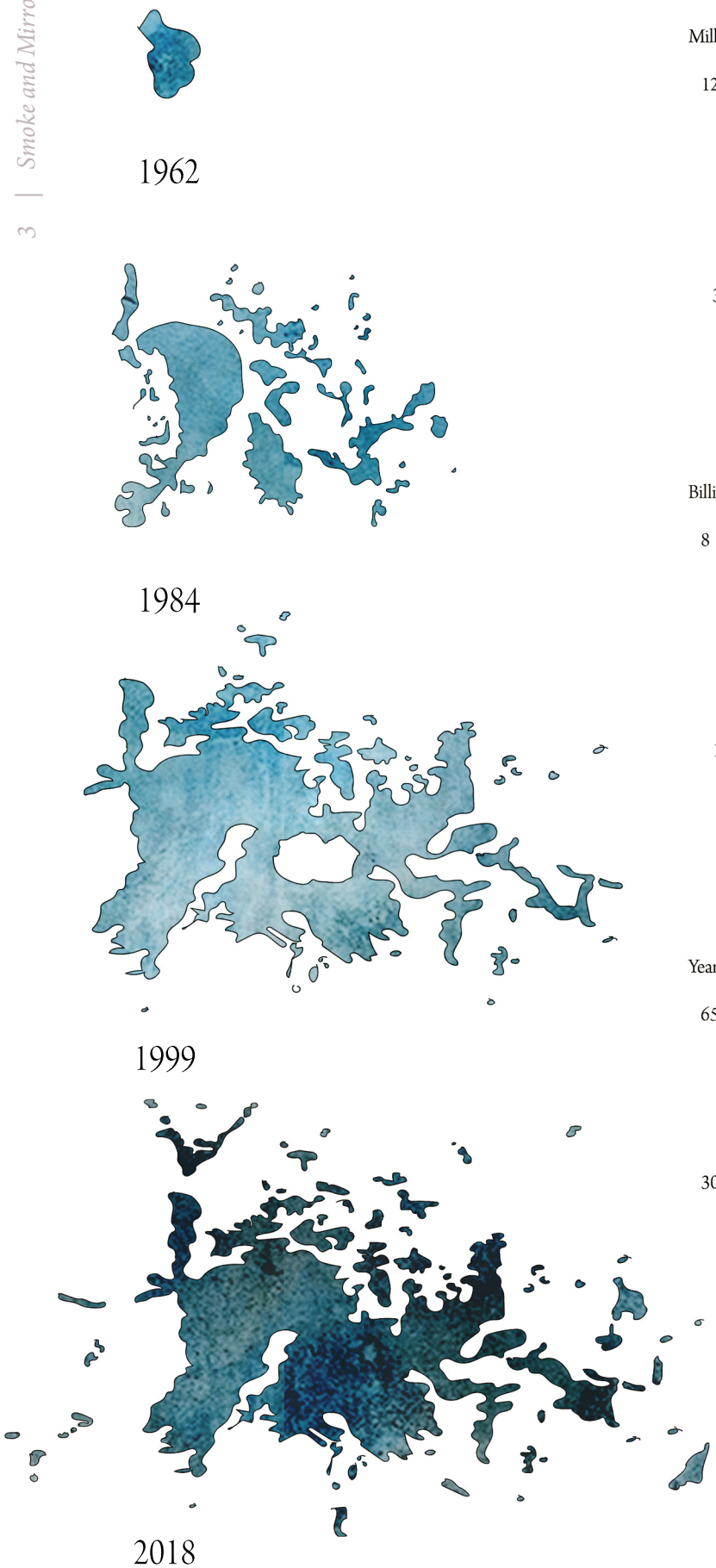
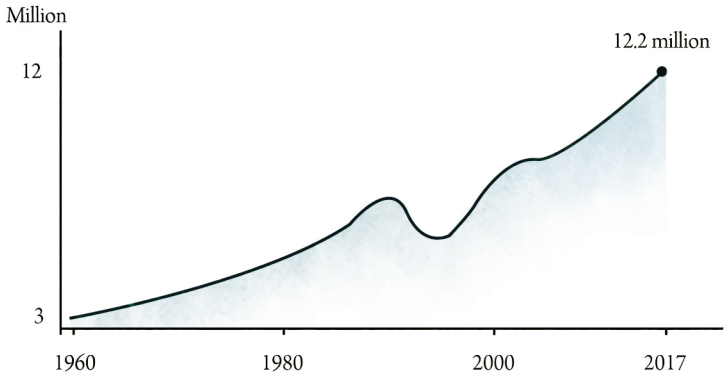
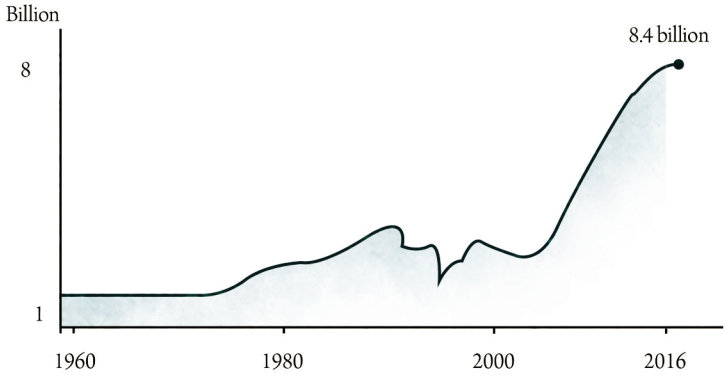
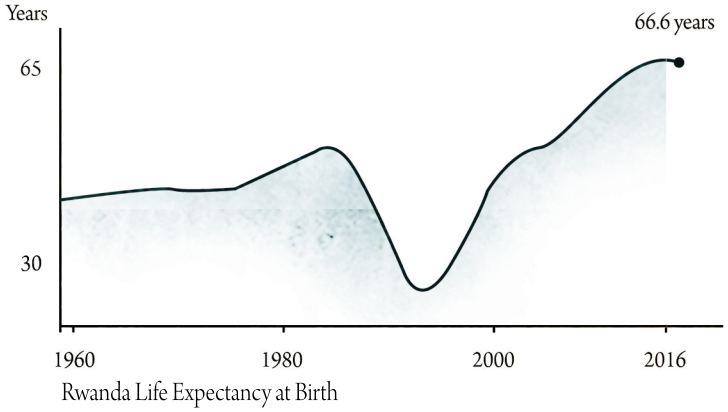


Figure 3.06:Expansion of Kigali over the years







Source : World Bank

Figure 3.07:Graphs indicating growth in population, GDP, and life expectancy in Rwanda

Figure 3.08: Image indicating the topographical character of Kigali

Figure 3.09: Informality in wetlands of Kigali city.

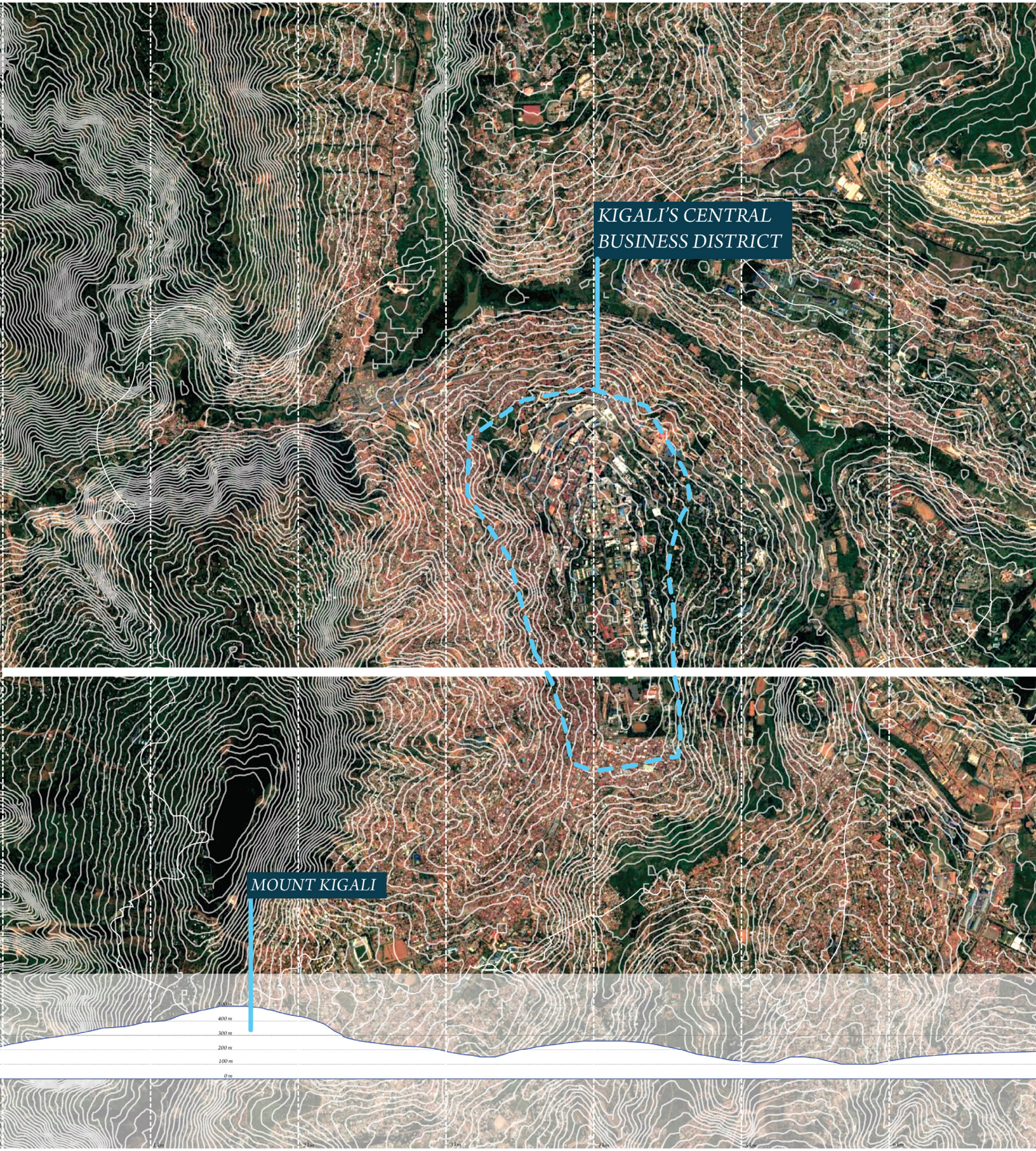


Figure 3.10: Map of the city of Kigali, with topographical lines, and section illustrating topography across the city

SECTION CUT
1 km
N
7 km
8 km
9 km
10 km
11 km
12 km
13 km

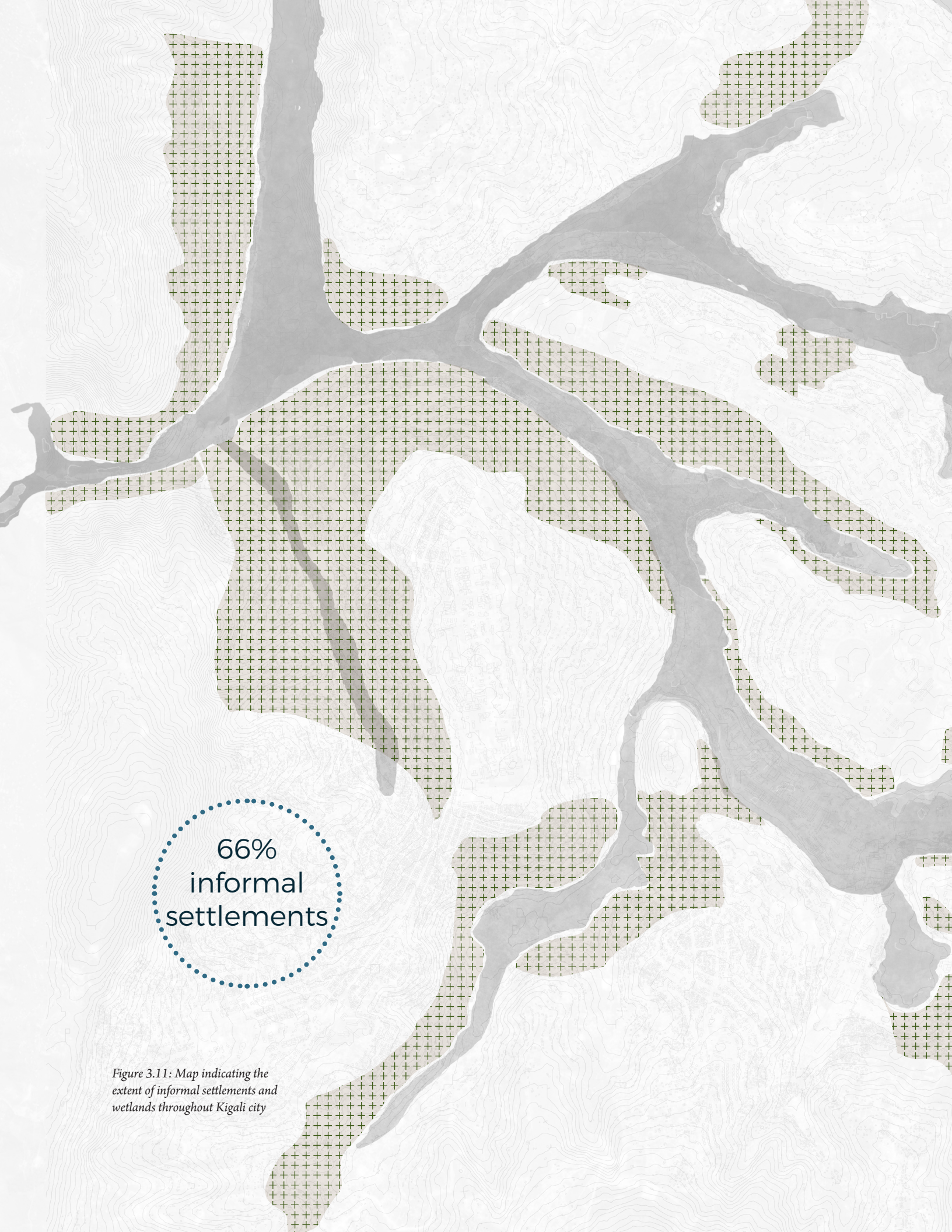


Figure 3.11: Map indicating the extent of informal settlements and wetlands throughout Kigali city

3.2 Introducing the Masterplan

In response to the accelerated urban boom currently faced by Kigali, the government of Rwanda commissioned the Oz Architecture Team, a firm based in the United States, to develop an initial version of a masterplan for Kigali. The proposal was titled the 'Kigali Conceptual Masterplan' and was adopted by the Rwandan parliament in 2008.[55] Following this, a series of iterations of the masterplan have been introduced by American, Singaporean and Chinese firms over the last few years. Branded under the names 'Masterplan 2013', 'Vision 2020', 'Vision 2040', among others, these schemes of urban regeneration perfectly epitomise the modernist vision of a neo-liberal urban realm.[56]

The main features of the aforementioned proposals are artifacts intensively impregnated with the modernist doctrine: dominating glass-box towers, landscaped boulevards and freeways. The main aim of these developments is to propel Kigali on the international scene, as a model city for safety, investment and innovation, as an exemplary hub for Information and Communications Technology (ICT), finance and logistics in the African region.[57] Rwanda currently presents itself as the 'Switzerland of Africa', with a clear commitment to business-friendly development. In 2016, the World Bank ranked Rwanda as the second easiest African country to open a business. However, the reality of doing business in Rwanda is more complicated that what statistics show. With a rigorous tax regime, high importation costs and a landlocked geography, the rate of investor turnover is growing, hence questioning whether this ease of trade will be economically sustainable in the long term. [58]

Other comparisons have been employed, most commonly alluding to Rwanda as the 'Singapore of Africa'.[59] Taking great pride in the latter, the government of Rwanda seems convinced that this approach to urban development is the key to a prosperous nation, to achieve recognition and a high market value on the global scene.

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55 Uwimbabazi, Penine , and Ralph Lawrence. 2011. "Compelling Factors of Urbanization and Rural-Urban Migration in Rwanda." Rwanda Journal 22 Series B.

56 Goodfellow, Thomas. 2013. *Kigali 2020: the politics of silence in the city of shock*. March 14. Accessed February 25, 2018. https://www.opendemocracy.net/opensecurity/thomas-goodfellow/kigali-2020-politics-of-silence-in-city-of-shock.

57 Goodfellow, Thomas. 2013. *Kigali 2020: the politics of silence in the city of shock*. March 14. Accessed February 25, 2018. https://www.opendemocracy.net/opensecurity/thomas-goodfellow/kigali-2020-politics-of-silence-in-city-of-shock.

58 Ibid.

59 The Economist. 2012. *Africa's Singapore*. February 25. Accessed November 20, 2017. https://www.economist.com/business/2012/02/25/africas-singapore.

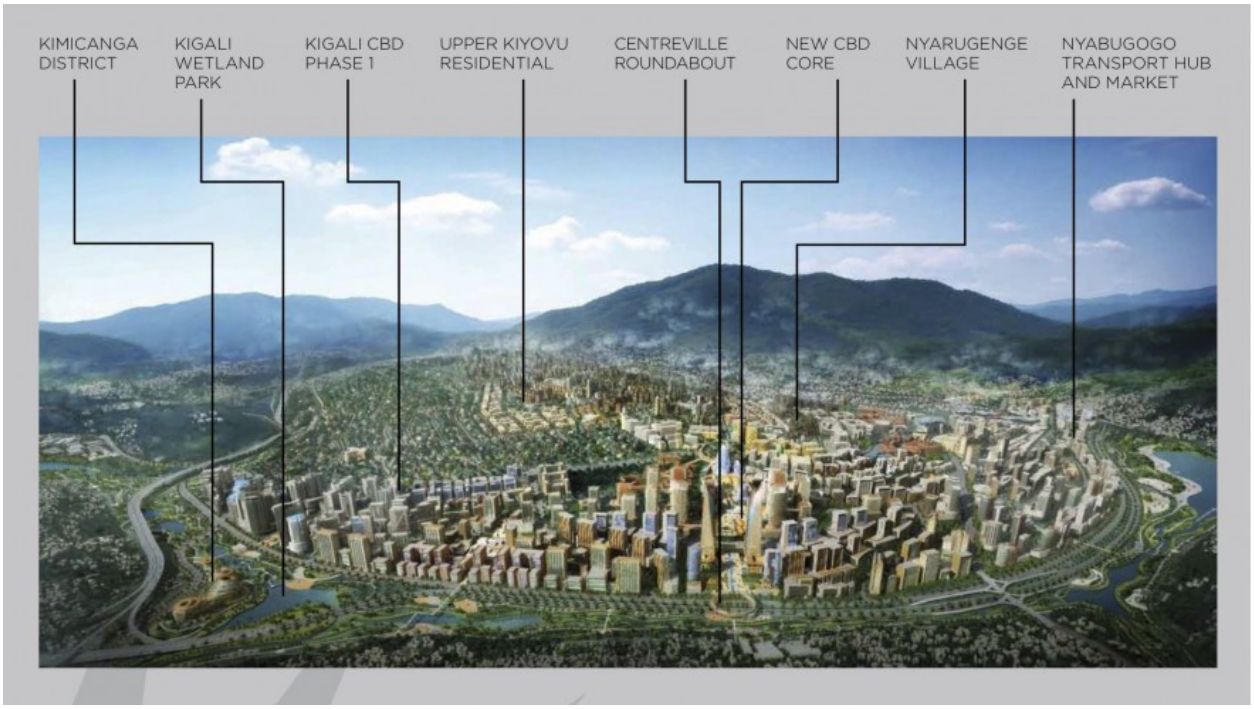


Figure 3.12: Bird's eye of proposed masterplan with a very dense Central Business District core. The wetlands and Nyabugogo Transport hub are unrecognisable from what they are today

Figure 3.13: Render of the masterplan proposal

3.2.1 Proposed developments

The current motions for the development of Kigali propose very ambitious plans of action. One of the main components is the regeneration of the Central Business District core, with the erection of a multitude of podium-style buildings superimposed with high-rise tower blocks, bearing great resemblance to constructions in North American cities. The podiums have been designed to accommodate retail spaces, while the towers shall accommodate office or residential purposes.[60]

The revitalisation of the Nyabugogo transport hub and surrounding areas is also a key element on the agenda. 'Transport hub commercial towers' have been proposed as new urban nodes, and as an attempt at restoring order in the presently chaotic transport hub. The surrounding areas shall be redeveloped into a contemporary market and commercial zone.[61]

As a solution to the rapid urban sprawl, the master planning reports promote the densification of existing residential zones. The latter indicate the redevelopment of a great portion of single family residential areas – most of which are currently informal settlements - into medium and high-rise residential constructions across the city. [62] Furthermore, industrial areas within the City of Kigali are presently being relocated to the Special Economic Zone, located east of the city, as per the masterplan.[63]

Regarding Kigali's wetlands, the master plan puts forward ideas towards a radical transformation. The Nyabugogo wetland has been rendered into a gleaming wetland park.[64] The proposed images for the current industrial area in the Gikondo wetland suggest the creation of another wetland park with an artificial lake[65], while another report issued by the Rwanda Environmental Management Authority (REMA) suggests the implementation of artificial fish ponds at the Nyandungu wetland park.[66]

60 City of Kigali. 2013. "Nyarugenge District - Zoning Plan Report."

61 Ibid.

62 Ibid.

63 Tumwebaze, Peterson. 2017. Kigali Special Economic Zone impacts Rwanda's industrial growth. June 01. Accessed January 20, 2018. https://www.newtimes.co.rw/section/advertorial/913.

64 City of Kigali. 2013. "Nyarugenge District - Zoning Plan Report."

65 The East African. 2017. Relocation of firms delays rehabilitation of Gikondo. May 13. Accessed June 16, 2018. http://www.theeastafrican.co.ke/rwanda/News/Relocation-delays-rehabilitation-Gikondo/1433218-3925258-ealvlj/index.html.

66 Rwanda Environment Management Authority. 2017. "Developing an Improved Design Plan of the Park and Construction Supervision of Nyandungu Urban Wetland Eco-Tourism Park."

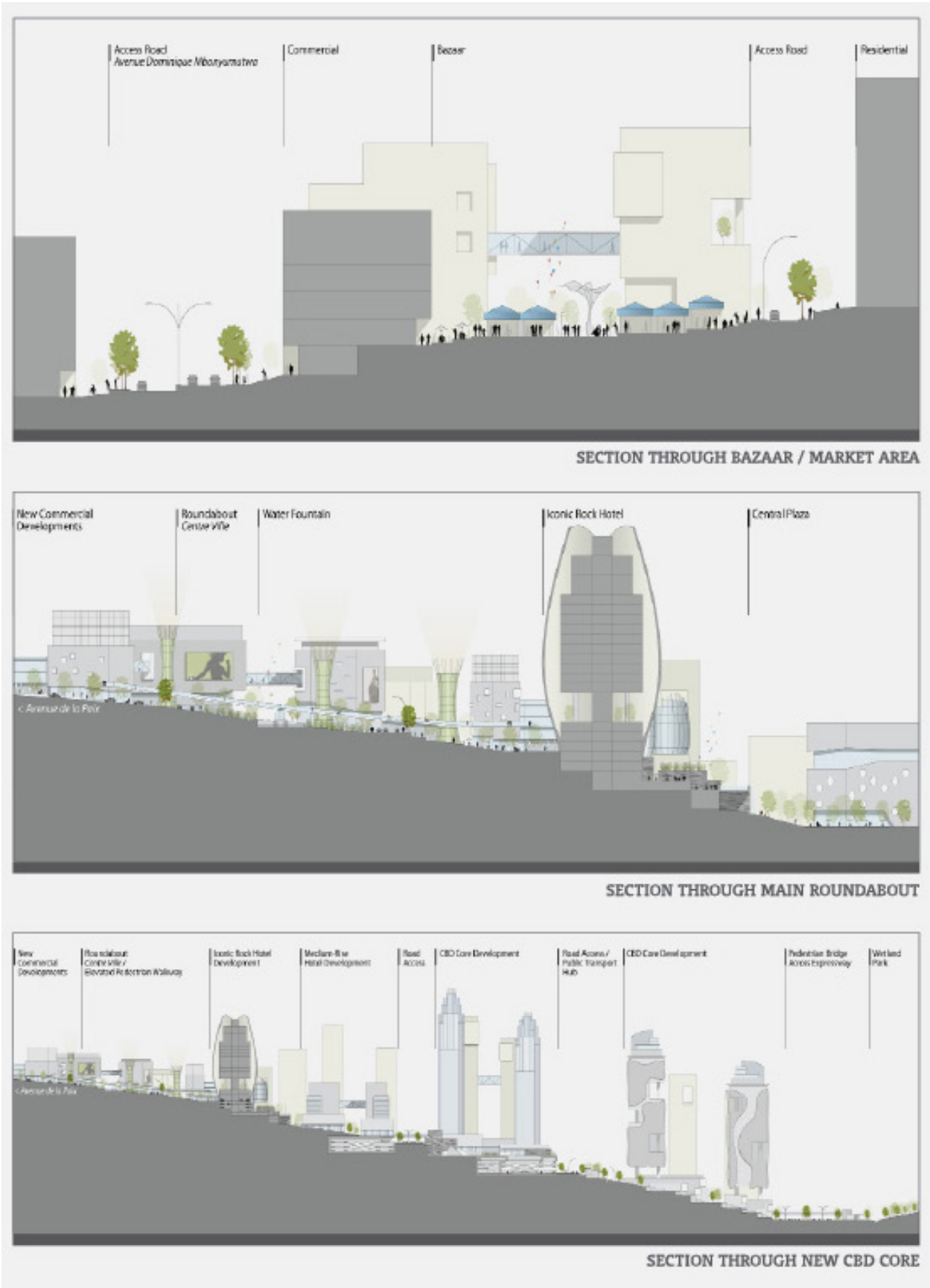


Figure 3.14: Drawings extracted from the Master Plan report from the City of Kigali, illustrating sections of the proposed developments

3.2.2 Trouble in Paradise

The Rwandan city is composed of an intricate assembly of binaries, notably urban and rural, formal and informal. The Kigali Conceptual Master Plan, along with its successors, do not account for any of those exclusive attributes, but instead propose an alienated approach that completely disregards the contextual issues presented by Kigali's urban fabric.

Those master plans are part of a growing network of 'new' cities currently trending over the African continent,[67] with the main common goal being the illustration of Africa as 'modern', as well as attracting private investors. While the visualisations of those master-plans appear extremely compelling, they all present problematic characteristics:

- The planning is carried out on a large scale, often suggesting that the development start from a blank slate, hence promoting the eradication of numerous areas of informality.
- Those informal settlements shall eventually be replaced by 'low-income' housing and high-end apartments, edifices that would lie beyond the financial reach of most of the Kigali's inhabitants. This would potentially result in an oversupply of high-end housing, with a high risk of those buildings becoming redundant and derelict.
- The concerned plans' designs are based on a graphic, visually appealing foundation as opposed to realistic land-use plans, with no rational approach of implementation.[68]
- There is no evidence of a democratic approach regarding their implementation, but rather a forceful and imposing strategy is presented.

Indeed, in the case of Kigali, established proposals promote a westernised cityscape, that is disconnected from local customs, cultural dynamics and agricultural practices. As mentioned in Section 2.3, the sterility of the city is a priority. The informal settlements are absent on the new plans, the wetlands have been transformed into spotless parks for the elite, and a multitude of glass towers rule over the cityscape. Furthermore, there has been no consideration in regard to the existing relationships between the different com-

67 Watson, Vanessa. 2014. "African urban fantasies: dreams or nightmares?" Environment and Urbanization Vol 26, No 1 215-231.

68 Ibid.

ponents of the urban fabric: the formal and the informal, the informal and the wetlands, the topographical and the cultural, the social and the economic.

The blue area on figure … highlights an area with a high concentration of informal dwellings. The masterplan, on the right, shows the same area, and the informal houses are no where to be seen. They have instead been replaced by high-rise office blocks and residential towers. The masterplan primarily threatens informal dwellers and other low-income citizens, who are under the constant fear of losing not only physical shelter, but also their entire social, cultural and economic ecosystems.

3.2.3 Current developments

Following the basis of modernity, constructions are rapidly shooting up across Kigali's skyline, aiming at rendering it into a world-class urban incubator in the next years to come. Significant investment has been directed into high-end retail, hotels and convention centres, and a multitude of constructions in progress can be observed across the city. Figures … illustrate some of those structures of the powerful that have already taken shape in Kigali.

The state is also investing in building several university campuses to maximise the opportunity of Rwandan youth to obtain high-level education. The issue with this initiative is that there is a lack of employment opportunities to accommodate this high incidence of university graduates. As a result, a great proportion of young Rwandans fall into unemployment, since their acquired academic skills become redundant amidst a society primarily operated by manual-skilled labour.

Various residential schemes have also materialised across Kigali. Bearing no resemblance to the typical Rwandan dwelling, those residential estates turn out to be unfit for the cultural dynamics, and are struggling to find tenants due to the inaccessible rent and buying prices. The same situation applies to the newly-built retail spaces. These structures harbour rental prices that are unaffordable to local business owners, leading to the abandon and neglect of the unfamiliar typologies, thus leading to urban decay.

In the light of what has been discussed throughout this section, there are grounds for the questioning and the exploration of new urban regenerative methods that advocate for a healthier cityscape, and that are less favorable towards promoting social and environmental alienation.

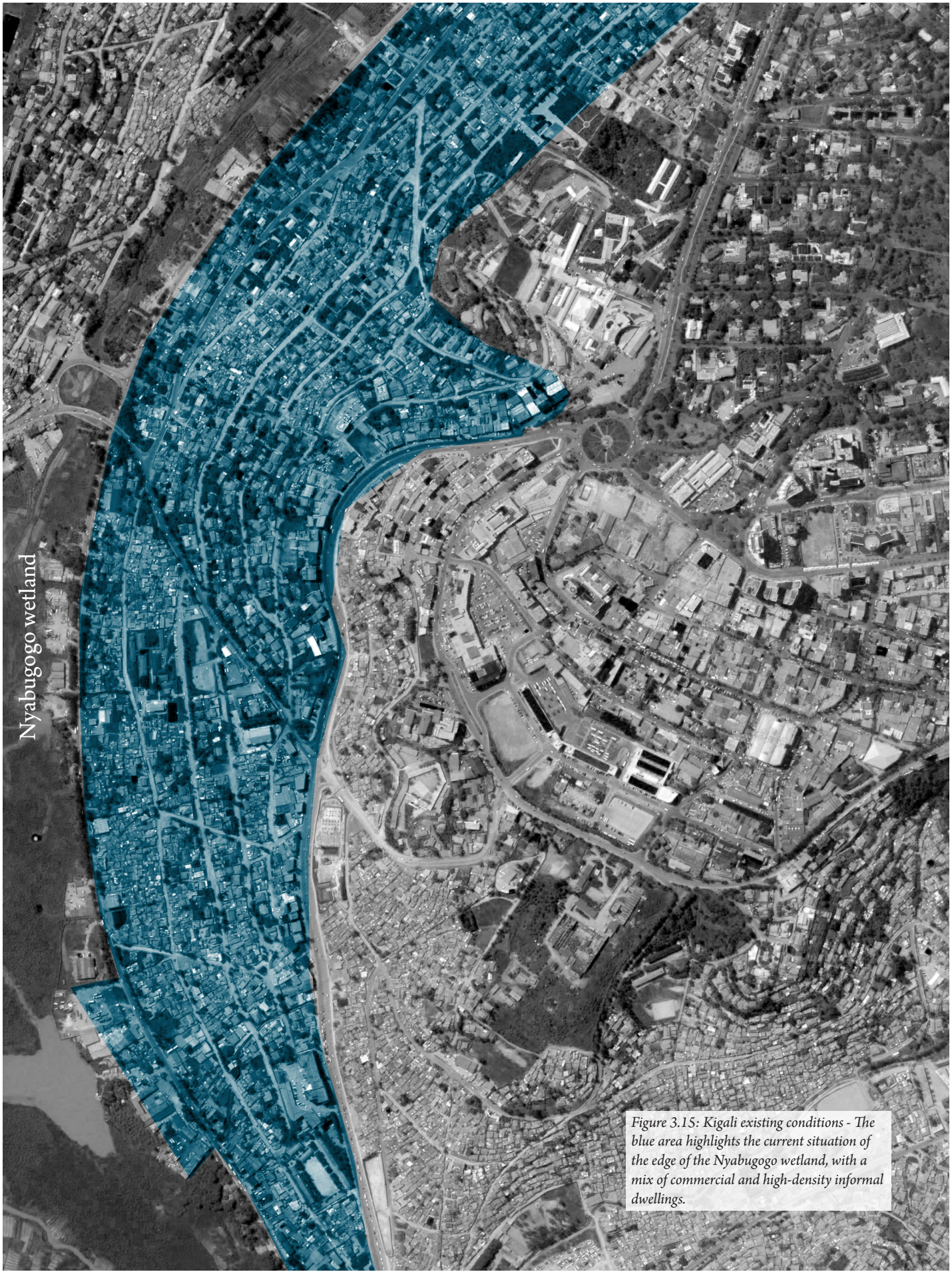


Figure 3.15: Kigali existing conditions - The blue area highlights the current situation of the edge of the Nyabugogo wetland, with a mix of commercial and high-density informal dwellings.

Figure 3.16: Section of proposed masterplan - The blue area highlights the proposed mid-rise/high-rise developments elaborated by the masterplan, where the informal areas on the Figure 3.15 have disappeared.
The implementation of this new proposal has also not been clarified, and the fate of the informal dwellers remain uncertain.

Figure 3.17: Agriculture in Agatare wetland, representing a harsh socio-cultural contrast to the proposed wetland parks

Figure 3.18:Current social relationships with wetlands

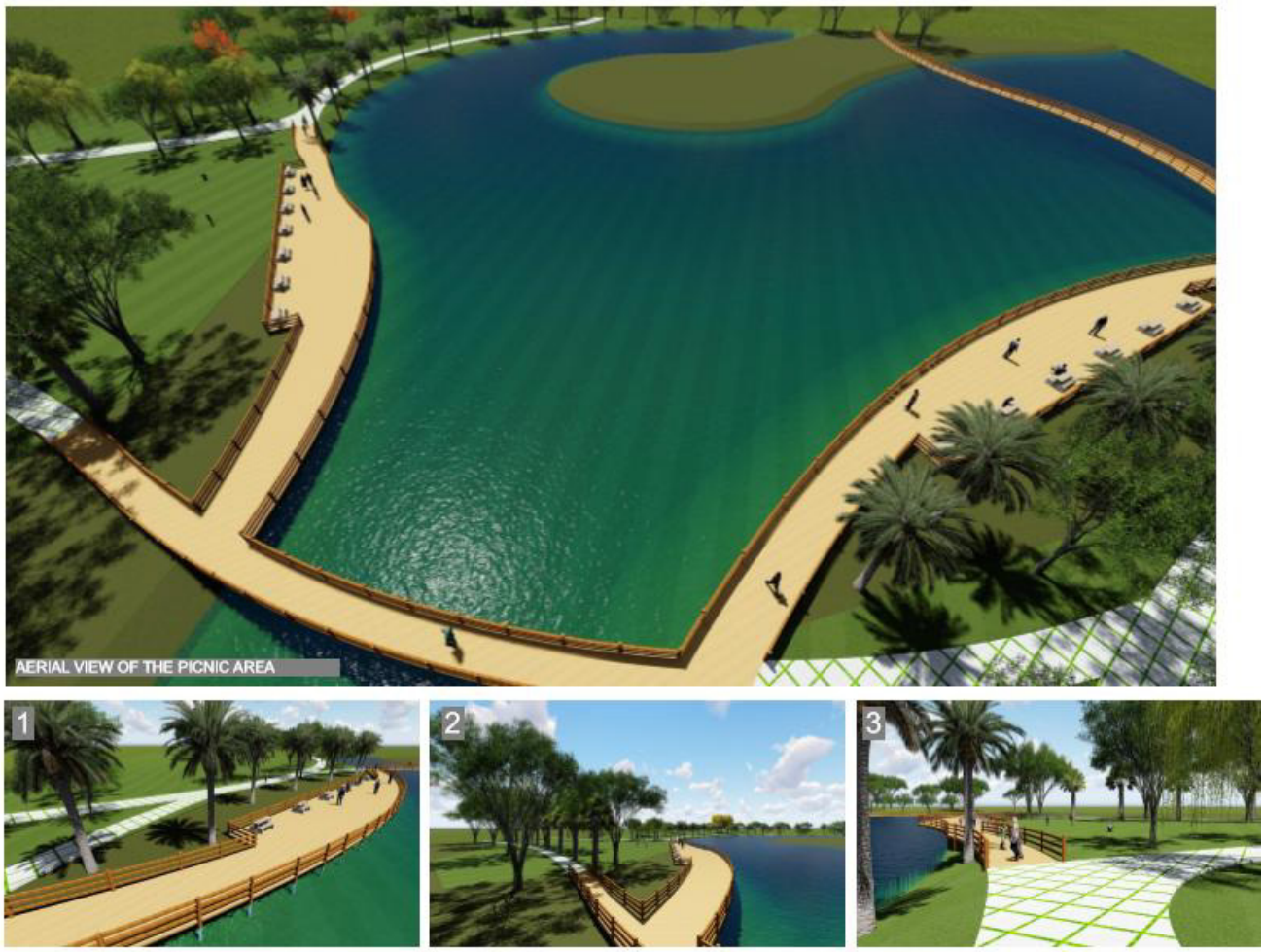


Figure 3.19: Image extracted from the report for the Nyadungu Urban Wetland Eco-tourism Park, illustrating an artificial lake and fish pond. A sharp contract with the current dyanamics illustrated on Figures 3.17 and 3.18.

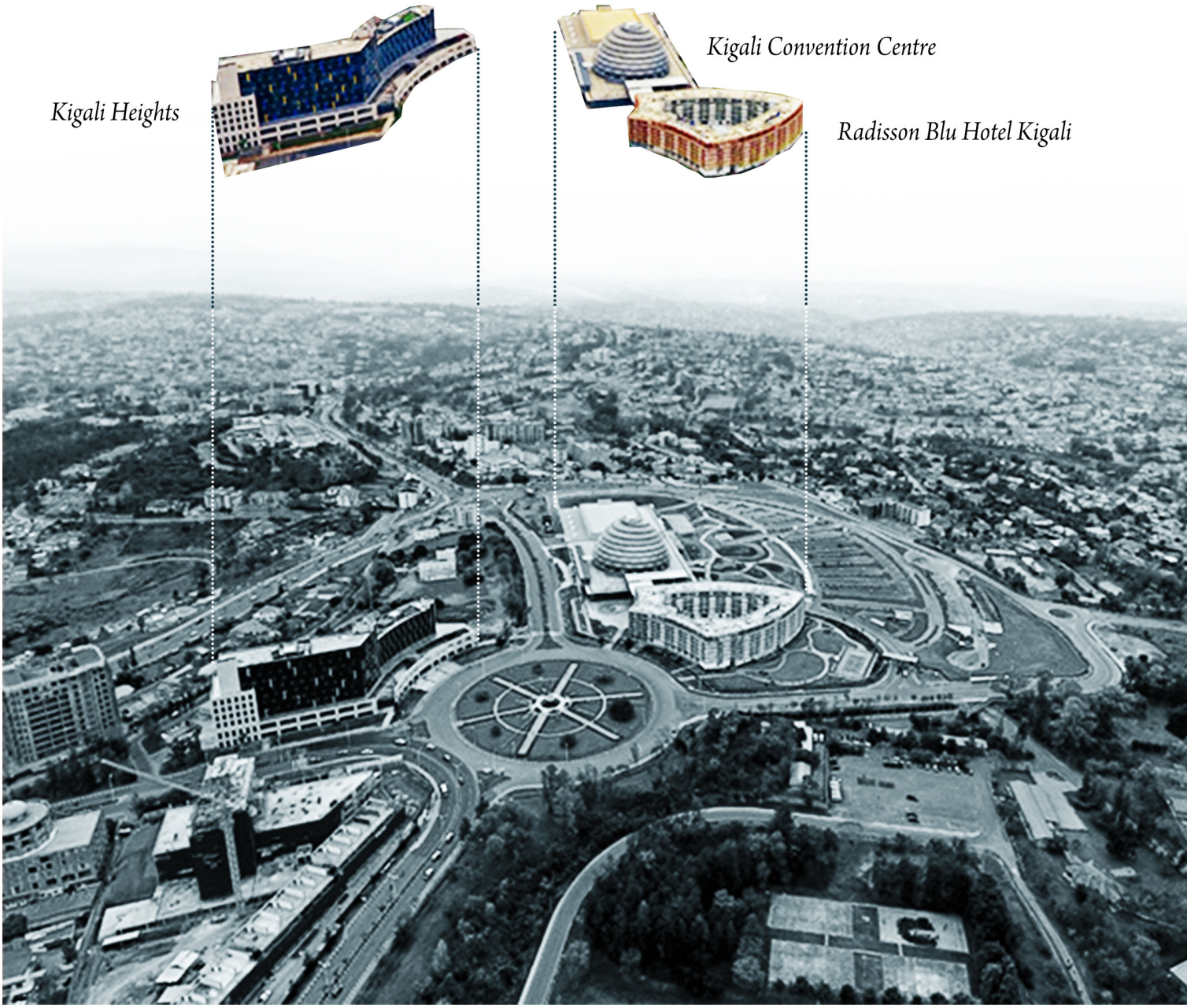


Figure 3.20:Current investment-driven developments in Kigali, as part of the master plan.

Kigali Convention Centre

Completed in 2016
Uses: Convention centre with seating capacity of 2.600 people, Kigali IT Park with rentable office spaces and retail space.
Owner-developer: Ultimate Concept Limited (consisting of Prime Holdings Limited, Social Security Fund of Rwanda and the Rwanda Investment Group)

Radisson Blu Hotel Kigali

Completed in 2016
Uses: Hotel mainly used for participants at conferences at the Kigali Conference Centre
Buildings costs: USD 300 million

Kigali Heights

Completed in 2017
Uses: High end office and retail space.
Financed by: Fusion Group (Kenyan firm)
Buildings costs: USD 40 million

Hilltop of Downtown Kigali

Figure 3.21:Current investment-driven developments in Kigali, as part of the master plan.

igali Mariott Hotel

Kigali City Tower

Completed in 2011
Uses: 20 storey office space, 4 storey retail space, 4 storey car park
Contractor: China Civil Engineering Construction
Funded by : Rwandan Businessman Hatari Sekoko
Building costs: USD 20 million

Kigali City Hall

Completed in 2015
Uses: Houses the main administrative governing bodies of Kigali
Buildings costs: USD 10 million

Kigali Mariott Hotel

Completed in 2016
Uses: High end hotel rooms for business and leisure.
Financed by: New Century Development Ltd
Buildings costs: USD 65 million

Figure 3.22: Widespread business space typology in Kigali's Central Business District

Figure 3.23: Empty retail spaces in Kigali City Tower

Figure 3.24: Typology of informal dwelling, very common across Kigali

Figure 3.25: Aerial view of Belle Vue Estate, which forms part of the residential developments established to densify the CBD core and revamp exsiting residential areas

3.3 On colonial modernity

As described by Gerard Aching, the term 'colonial modernity' does not necessarily refer to external global forces imposing change on communities; colonialism can also emanate from an internal origin through passive approaches. Dominance, exerted by the local state, can be manifested through circuits of social and economic activities, transactions and influences, under the pretence of striving for excellence and using compelling arguments for 'improvement' as an alibi. [69]

Indeed, it appears that an internal new wave of colonialism, despite being more subtle, is building up in modern-day Rwanda; a force exerted by the local authorities themselves. This argument is accurately illustrated through the various masterplans mentioned in the previous section.

Firstly, those plans all bear characteristics of a *Tabula Rasa* approach, by promoting the re-building of the city from a clean slate, which implies wiping out the existing settlements of informality across Kigali. According to Watson, some evictions have been reported across the city following the implementation of the masterplan, but the extent of those evictions, and where these households have moved to, is not clear.[70] Certainly, through the implementation of the Kigali Conceptual Master Plan, the state sees people as dispensable, and gives itself the power of controlling them in an authoritative manner, by driving them into outer areas where they would not hinder any planned construction.

Colonial modernism is also manifested through the master plan, as it gives no voice nor power to the people, treating them more like spectators rather than the protagonists of the proposed development. Neither the compelling graphics of the rigid tall glass boxes, nor the masterplan description, show a sign of public participation or involvement. The development alienates the middle and lower classes of Kigali, not just on a physical, but also on a social, emotional and psychological level.

In addition, various scholars, journalists and reporters have manifested their scepticism in regards to the ethics of the current Rwandan government. Straus describes the latter as repressive.[71] Through the aforementioned developments, he claims that the govern-

69 Aching, Gerard. 2011. 'On Colonial Modernity: Civilization versus sovereignty in Cuba' in International Relations and Non-Western Thought. Edited by Robbie Shilliam. New York: Routledge.

70 Watson, Vanessa. 2014. "African urban fantasies: dreams or nightmares?" Environment and Urbanization Vol 26, No 1 215-231.

71 Straus, Scott. 2014. "Twenty years after the Rwandan Genocide." Oxford University Press's Academic Insights for the Thinking World. Accessed November 05, 2017. https://blog.oup.com/2014/04/twenty-years-after-the-rwandan-genocide/.

ment seeks to exercise control over public space, especially around sensitive topics—in politics, in the media, in the NGO sector, among ordinary citizens, and even among donors. The net impact is the experience of intimidation and of an induced feeling of reticence. [72]

It can be observed that the Kigali Conceptual Master Plan further supports the modernist approach that many western cities celebrate. Indeed, those plans do present evident similarities with the fabric of global cities in the likes of Singapore, Dubai and New York. This imposed, out-of-context, modernisation only intends to accentuate social segregation, since the benefit of only a small segment of the population is considered. As a result, it becomes more difficult for the lower classes to move up the social ladder and prosper, both on a financial and social level. In the long run, this induced feeling of hopelessness generates frustration and anger among citizens, creating the ideal conditions to breed an eventual societal upheaval.

3.4 Financial dynamics

The visionary plans established by the state come with a great financial cost. Rwanda is largely banking on foreign investment and donations to concretise the visions of the masterplan. Most of the current financial investments are derived from the China Civil Engineering Construction Corporation and the New Century Developments, the latter being a real estate company based in Hong-Kong with a branch in Kigali. [73]

Furthermore, Rwanda has been a constant receiver of foreign aid over the past few decades. USAID, which is one of the major donors, has worked in close partnership with the Government of Rwanda to advance the objectives outlined in its Vision 2020 and Economic Development and Poverty Reduction Strategies.[74] Over the last 10 years, annual funding to USAID/Rwanda has increased from about USD 48 million in 2004 to over USD 128 million in 2016.[75]

The Rwandan government is also going the extra mile to establish good relations with nations of high global power towards obtaining loans. July 2018 marked the first visit of a Chi-

72 Ibid.

73 Watson, Vanessa. 2014. "African urban fantasies: dreams or nightmares?" Environment and Urbanization Vol 26, No 1 215-231.

74 USAID. 2018. History of USAID Rwanda. May 11. Accessed August 13, 2018. https://www.usaid.gov/history-usaidrwanda.

75 Ibid.

nese and Indian leader on Rwandan soil. [76]Xi Jinping, China's current president granted Rwanda with USD 126 million for the building of two major roads, while Narendra Modi, the current prime minister of India endorsed two loan agreements of USD 100 million each towards investment in Kigali's special economic zone.[77]

There seems to be an urge from the state to come up with any strategy possible to attract funds towards putting the plans for Kigali into action. This reasons for this situation are as follows: over the years, there has been a long-term mis-use of aid and investment regarding urban infrastructure. This has now created infrastructure backlogs, and a growing tendency for the government to accept any form of investment that they can get. Those private investors, drive in turnkey projects, that create noxious effects: empty malls, gated communities, enhanced segregation and stratification amongst society. Kigali is now faced with a situation called splintered urbanism, which is a term initially brought about by Steven Graham and Simon Marvin[78], which refers to the condition where informal neglect is combined with enclave elite urbanism, and hence creates a real urban paradox.

Figure 3.26 (next page): Structures taking shape across Kigali's skyline

76 Crabtree, Justina. 2018. Xi and Modi just visited Rwanda and supplied millions of dollars, here's why. July 24. Accessed August 13, 2018. https://www.cnbc.com/2018/07/24/china-xi-india-modi-visit-rwanda-kagame.html.

77 Ibid.

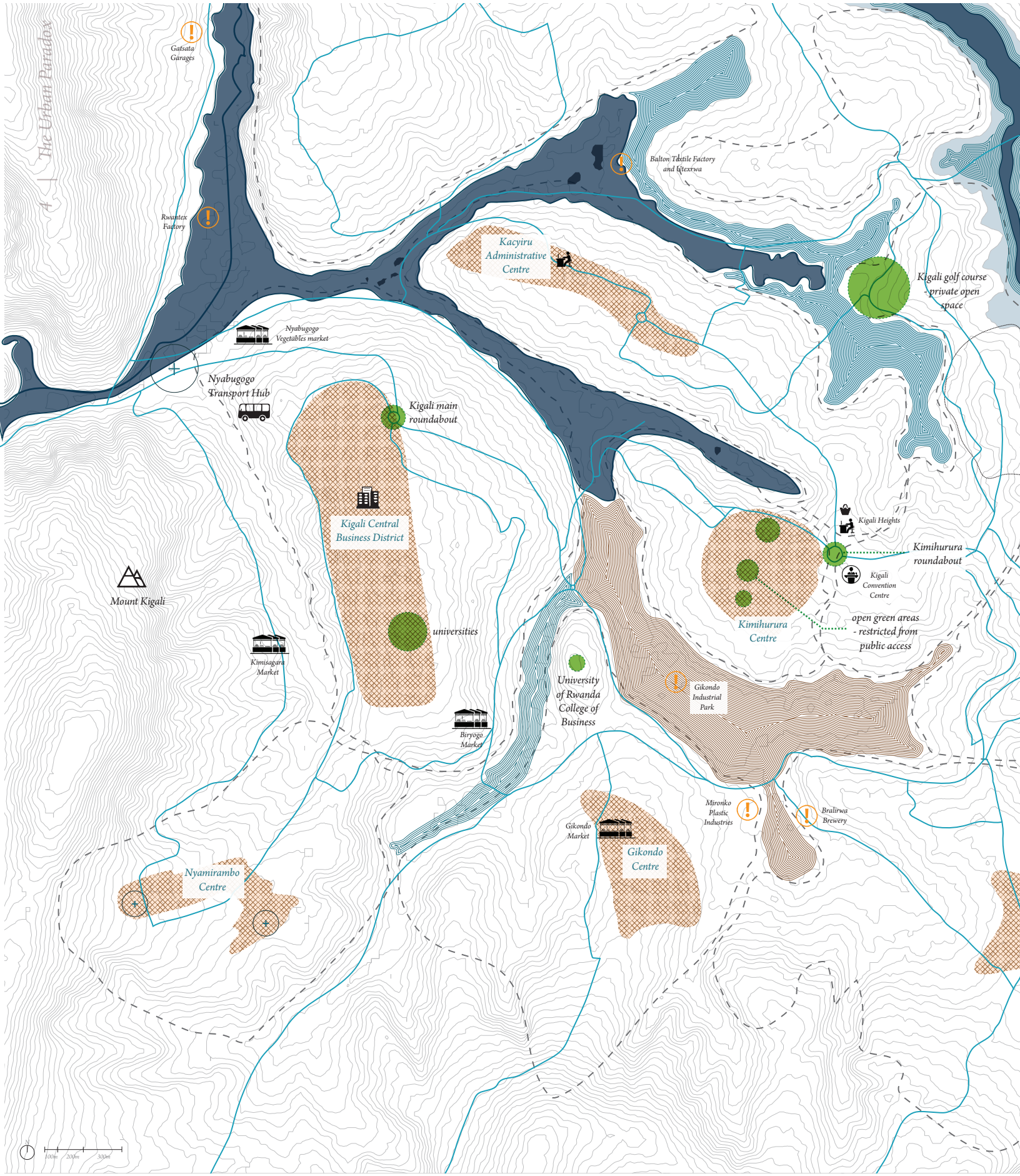
78 Graham, Stephen, and Simon Marvin. 2001. Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition. New York: Routledge.

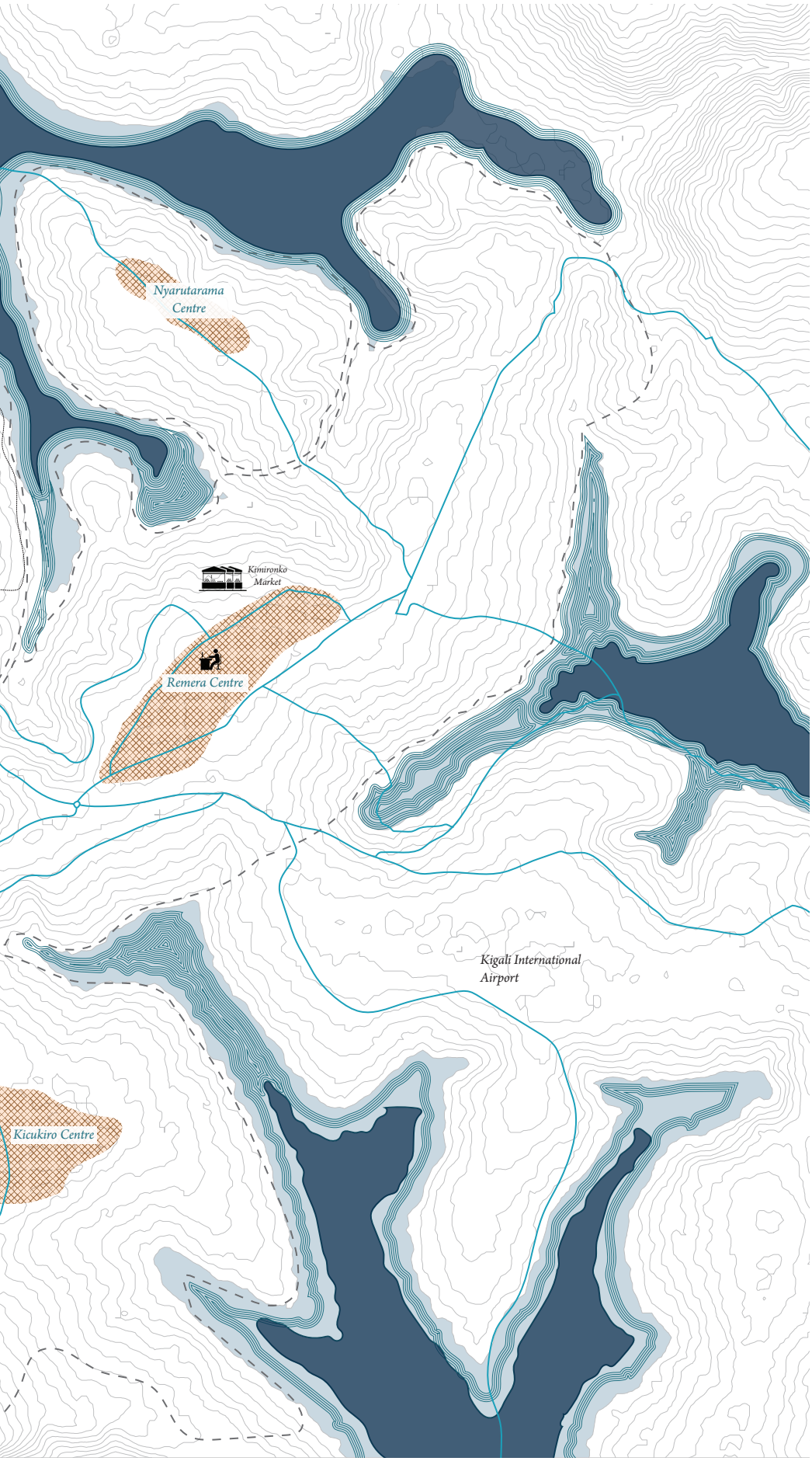
HYGEBAT

Figure 3.27: The Urban Paradox

4

THE URBAN PARADOX


Gatsata Garages
Rwantex Factory
Balton Textile Factory and Utexrwa
Kacyiru Administrative Centre
Kigali golf course - private open space
Nyabugogo Vegetables market
Nyabugogo Transport Hub
Kigali main roundabout
Kigali Central Business District
Kigali Heights
Kimihurura roundabout
Kigali Convention Centre
Mount Kigali
universities
Kimihurura Centre
open green areas - restricted from public access
Kimisagara Market
University of Rwanda College of Business
Gikondo Industrial Park
Biryogo Market
Mironko Plastic Industries
Bralirwa Brewery
Gikondo Market
Gikondo Centre
Nyamirambo Centre
100m
200m
300m



Defined wetland area

Neighbourhood centre

Open spaces

District defined by wetlands and topography

Major roads

Topography lines

Blurred edges of wetlands

Polluted wetland area

Major source of wetland pollution

Figure 4.01 (previous page): Agriculture practices in wetlands, with informal settlements overlooking the valleys

Figure 4.02 (left): map indicating the wetland edges across Kigali city. The map also shows how topography divides the city into districts, which each respective centre located at the top of the hill. The green circles indicate the very scare open spaces in Kigali, most of which are most commonly restricted from public access.

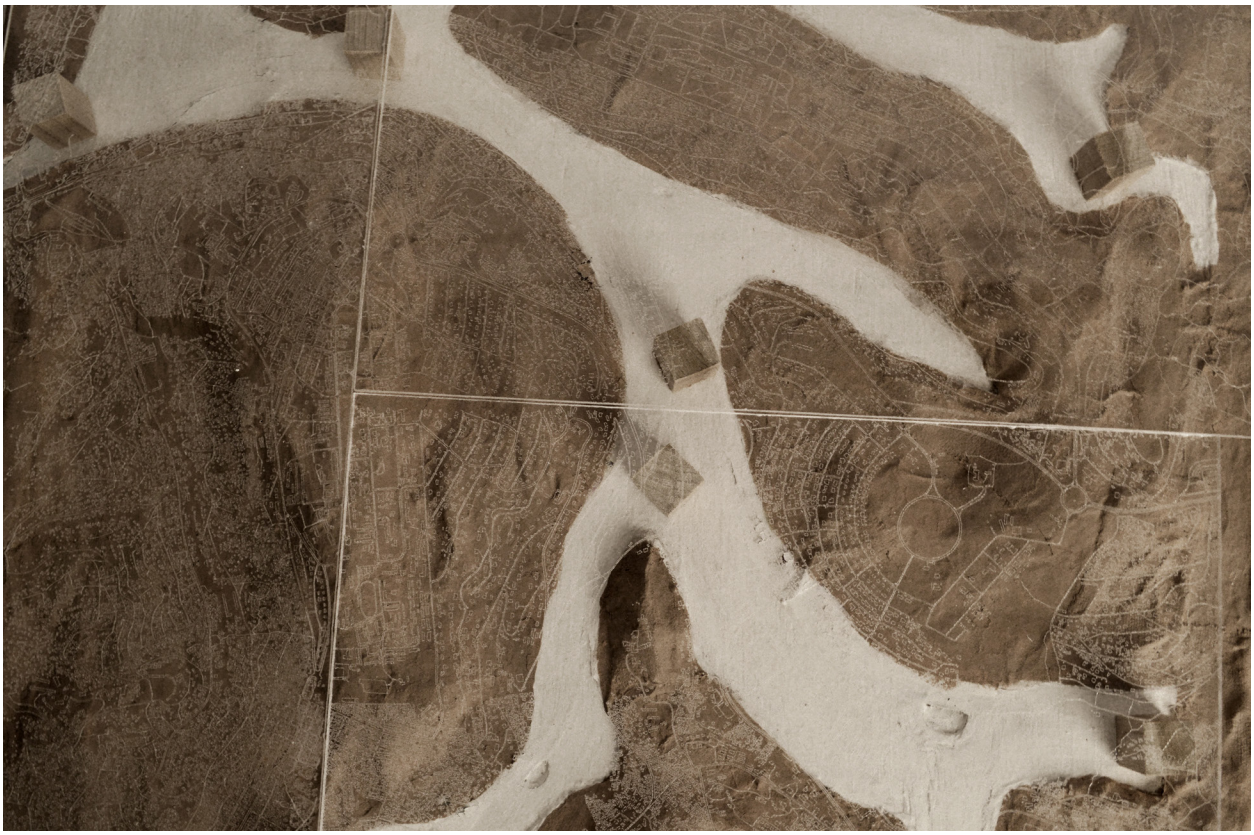


Figure 4.03 (previous page) and Figure 4.04 (above): Site Model showing the topography of Kigali and the relationship with the wetlands

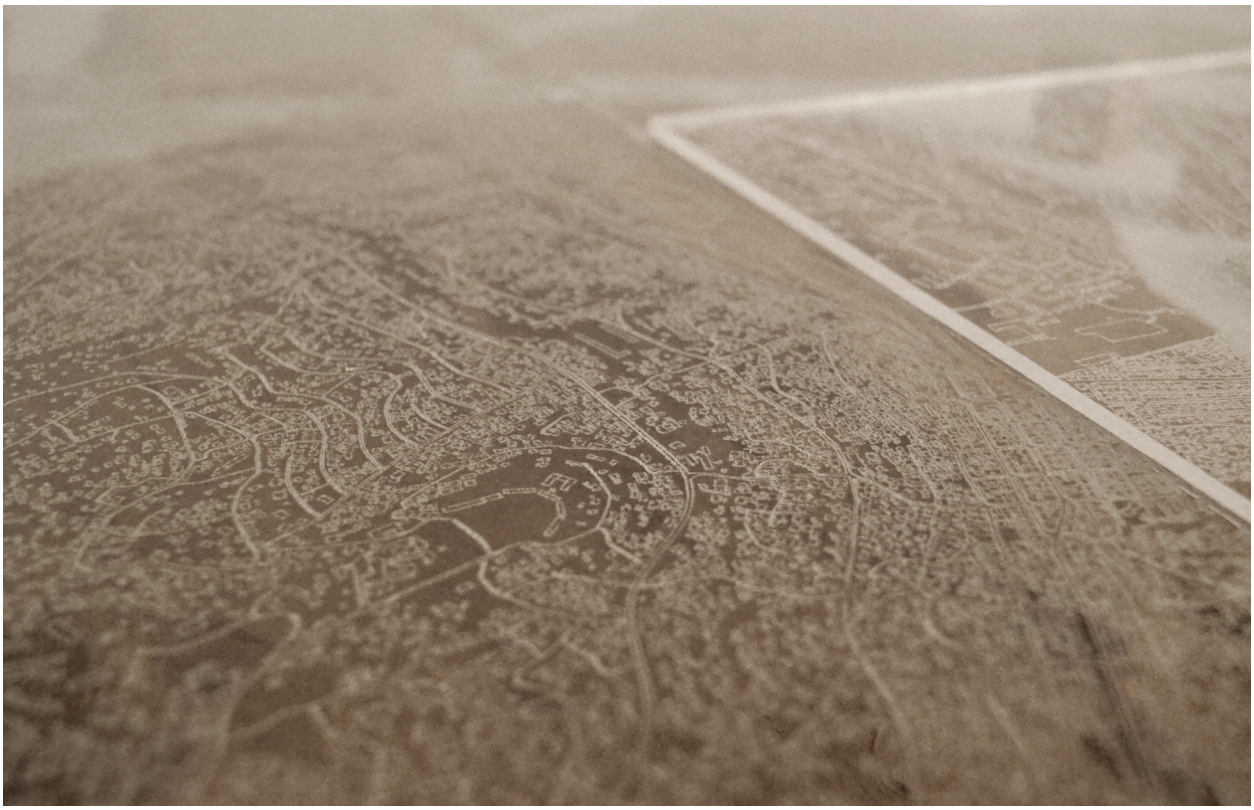


Figure 4.05: Site model detail

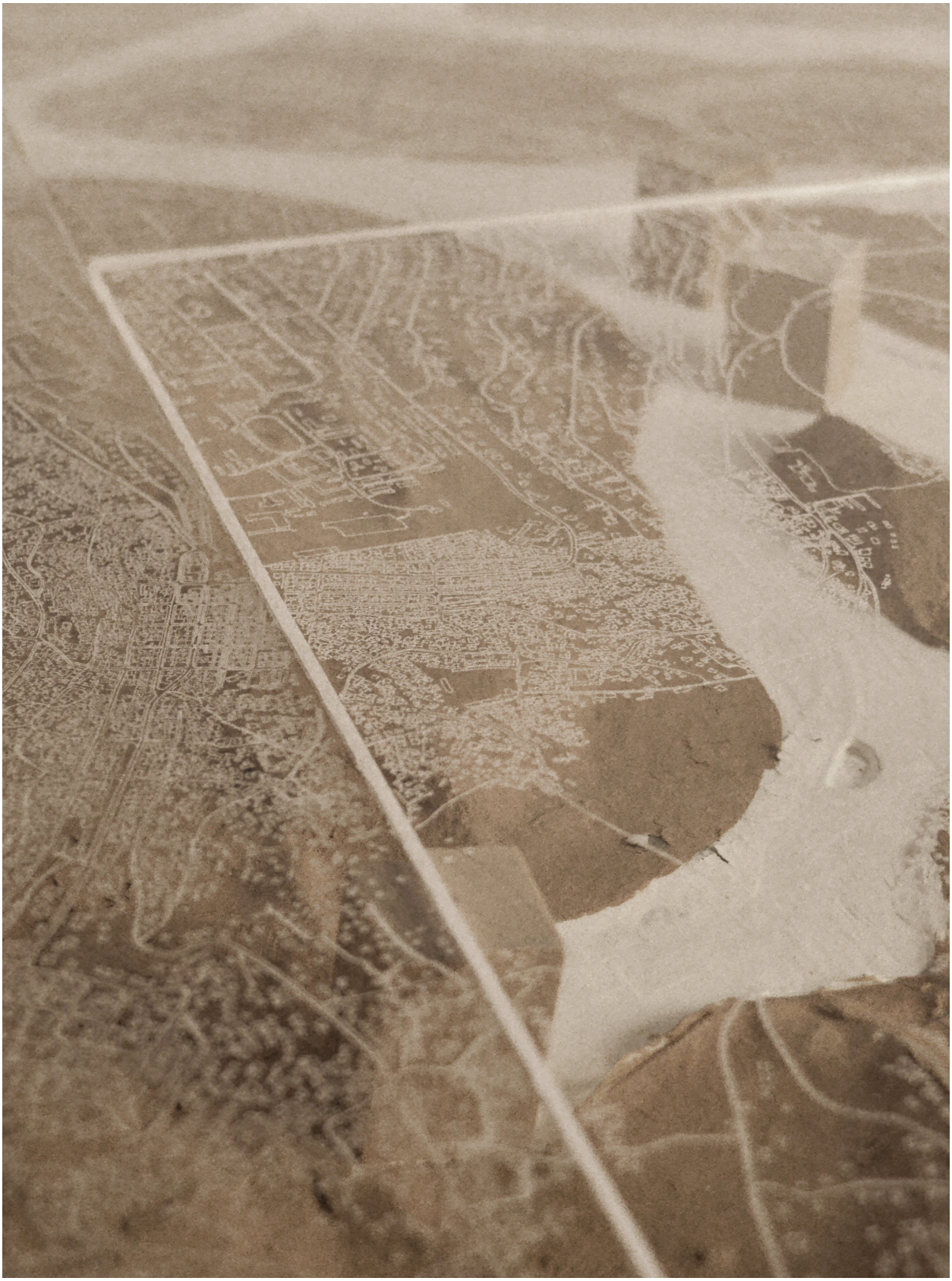


Figure 4.06: Site model detail

Urban conditions in emerging nations are composed of a complex configuration of a multitude of mechanisms. Each of these configurations constantly generates new urban patterns, patterns often unknown to the common global urban discourse. In order to address these patterns correctly, it is important to understand that simply applying Westernised principles of urbanism, as we know them today, will not generate the right conditions for these emerging cities to prosper sustainably and inclusively.

This chapter delves into the intricacies of the informal settlements and wetlands of Kigali, towards a better understanding of the inter-relationships that bind them, to eventually uncover more contextually-adapted design strategies.

4.1 Grappling informality

Kigali's hillsides are carved by wetland valleys, which are in turn bordered by informal settlements; a pattern that is constantly repeated across the city. It is important to highlight that those pockets of informality are not categorised as slums; the dwelling structures are not ramshackle and dilapidated as defined by slum conditions. However, informal dwellers in Kigali do not possess land ownership rights, and operate with inadequate infrastructure.

The informal settlement is the most prominent incubator of life around Kigali, housing 66% of the city's population.[79] The structure of informal settlements is also very dense, with very constraint spaces between dwellings, and a very limited provision of services. Dwelling units house on average 18 people over 200 square meters, with the owners and renters often co-habiting.[80]

The provision of water and sanitation are some of the key issues faced by Kigali's informal settlements. Dwellers may get their daily water supply through water dispensing points set up by the city, a practice which is quite unfavourable due to the remoteness of the dispensing points in relation to the informal settlement. Other more accessible ways of stocking up on water is through wetlands and water drainage canals, which often carry pollutants and contaminants.

In regards to sanitation, Kigali is not equipped with a central sewage system. Building owners need to take care of their waste on site and periodically use trucked services. This

79 Ansoms, An, and Donatella Rostagno. 2012. "Rwanda's Vision 2020 halfway through: what the eye does not see." Review of African Political Economy 427-450.

80 World Bank. March 2012. "Informal housing: Reducing disaster vulnerability through safer construction." Kigali, Rwanda.

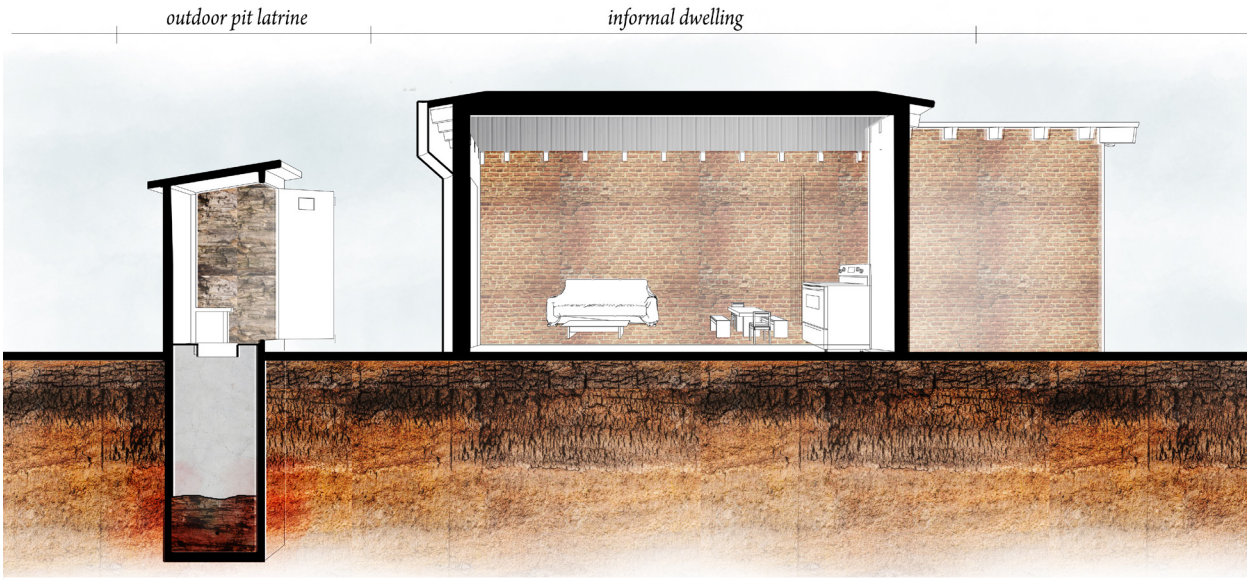


Figure 4.07: Section of an informal house equipped with a pit latrine sanitation system

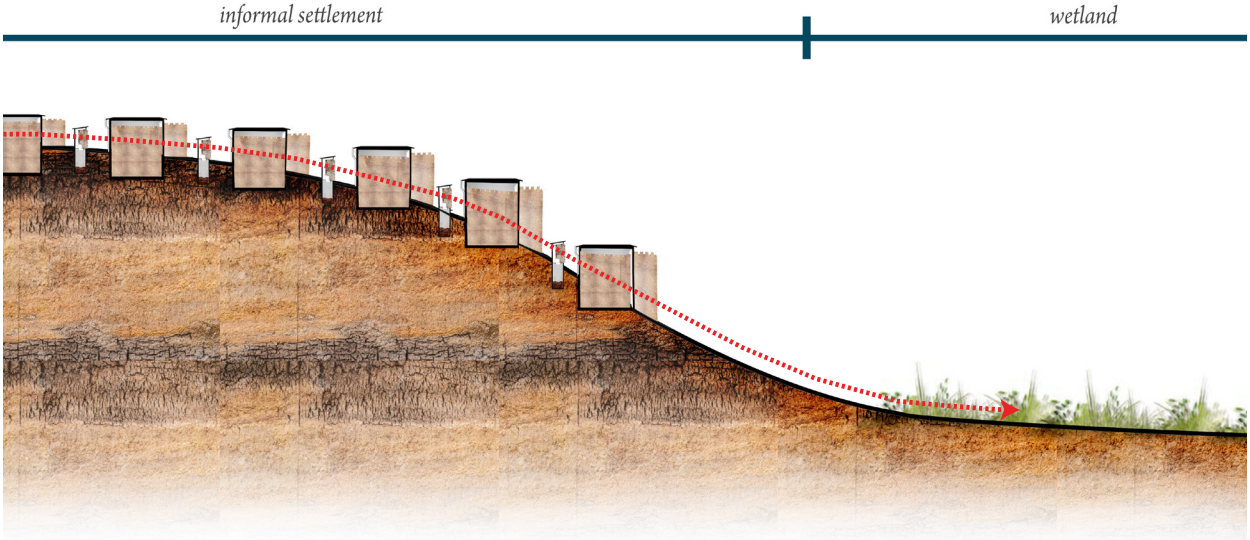


Figure 4.08: Section illustrating run-off water from the informal settlements into the wetlands

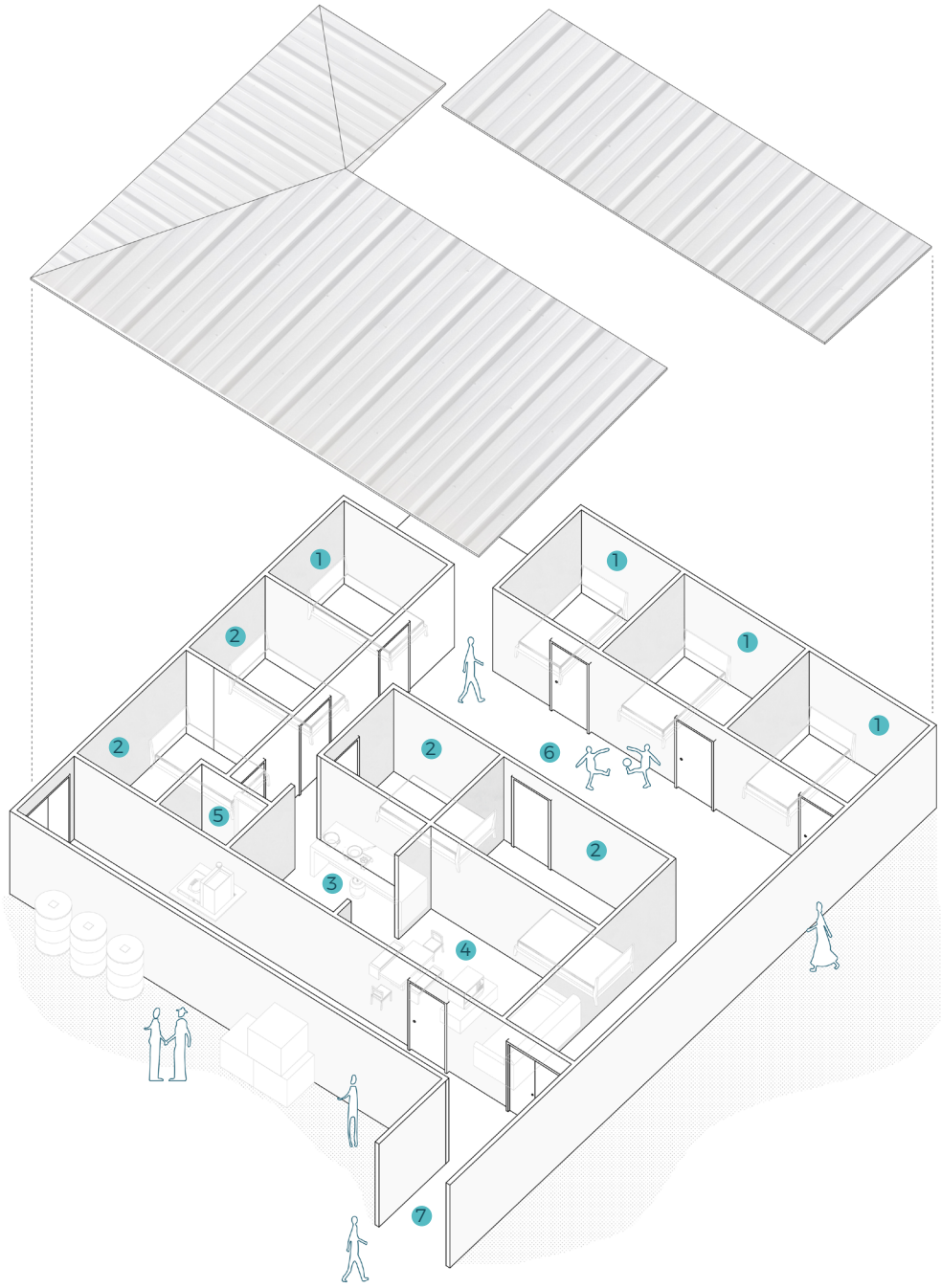
poses a problem in low-income neighbourhoods where residents cannot afford such services. The grey water and storm water of these low-income neighbourhoods flow in open channels into the wetlands mixing dirty water with the clear water streams in the fields. Toilets in these neighbourhoods are usually constructed as pit latrines shared by two to four families. Pit latrines are usually not emptied but once full, they are sealed with dirt and replaced by another pit latrine nearby.[81]

Public space in informal settlements is also very scarce and when existent, bears restricted access. As established previously, the authorities exert control over every aspect of urban life, in this case by forbidding access to the grass areas in Kigali's parks. With practically no access to open spaces, informal dwellers are compelled to re-appropriate the existing urban structure to establish gathering spaces that are very specific to their context. From shopfronts, markets, industrial areas, mobile kiosks, wetlands, or even just the street, informal dwellers are on the constant lookout for new patterns of communal interaction.

Figure 4.09: Matrix of existing greywater and blackwater disposal in Kigali

81 Ghandour, Marwan. 2016. The urban infrastructure for sustainability: learning from Kigali. Architecture Conference Proceedings and Presentations, 91.

Informal dwelling types

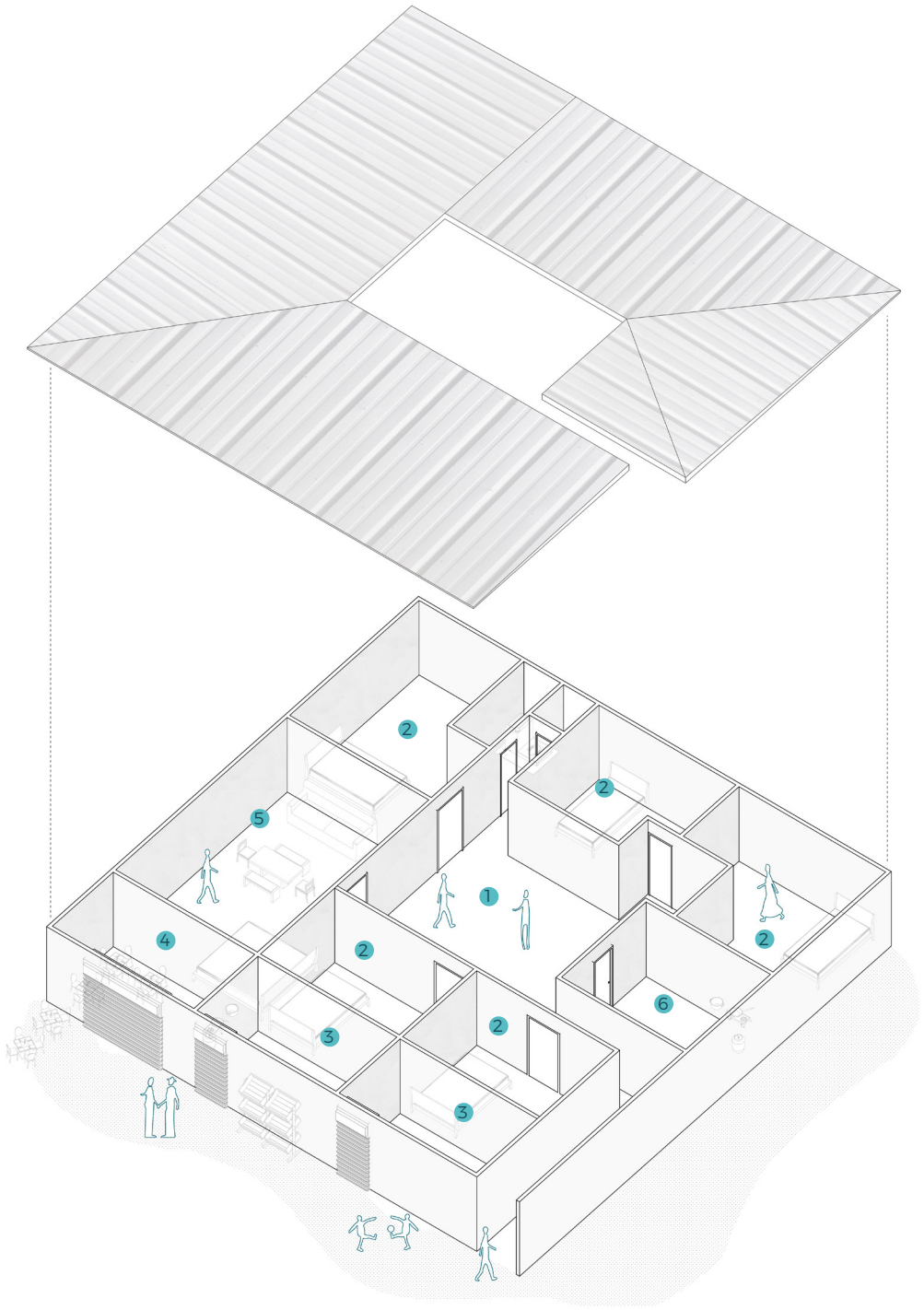


Fact Sheet:
Plot area: 150 sqm
Sanitation and water: 2 pit latrines, shower, infrequent piped water distribution
Residents: Mother and 7 children, 2 workers, 8 renters

1. Room (rent)
2. Room
3. Kitchen
4. Living and dining
5. Pit latrine
6. Courtyard
7. Narrow alleyway

Figure 4.10: Informal dwelling typology 1, housing solely residential purposes for owners and renters.

Informal dwelling types

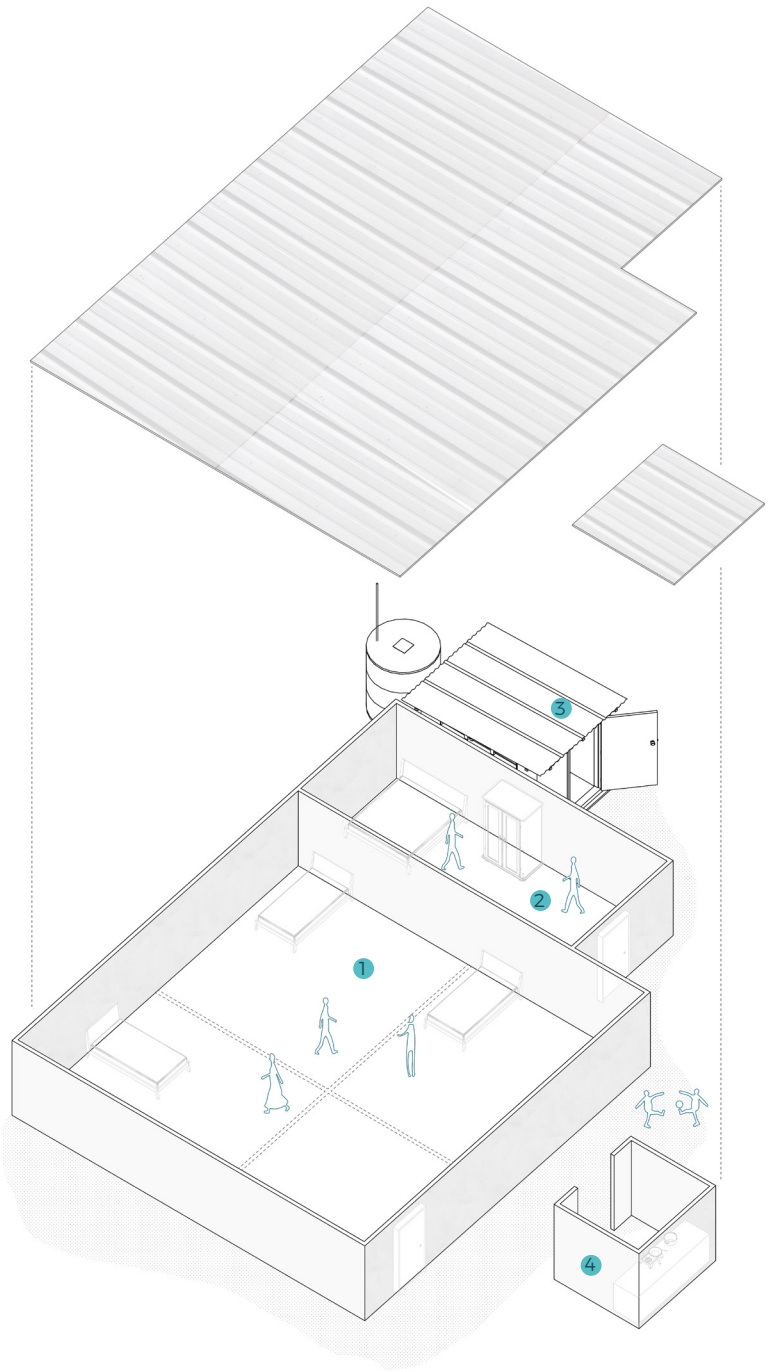


Fact Sheet:
Plot area: 225 sqm
Sanitation and water: 2 pit latrines, bath and piped water
Residents: 7 owners, 10 renters
Household income: RWF 150,000 per month

1. Courtyard
2. Room (rent)
3. Shop
4. Restaurant
5. Principal residence
6. Kitchen

Figure 4.11: Informal dwelling typology 2 with improvised restaurant and shops at the front of the dwelling

Informal dwelling types



Fact Sheet:
Plot area: 230 sqm
Sanitation and water: 1 pit latrine, shower, infrequent piped water distribution
Residents: 2 owners, 3 renters
Household income: RWF 75,000 per month

1. Rental unit for 3 people
2. Owner's unit
3. Pit latrine
4. Kitchen

Figure 4.12: Informal dwelling typology 3 with one single unit for renters and adjacent smaller unit for owners

Existing makeshift gathering spaces in informal settlements in Kigali

Figure 4.13: The shopfront

The picture illustrates women gathering outside a beauty salon in the Kimisagara settlement.

Figure 4.14: The street

The street is definitely the most common gathering space across Kigali, with the city's main streets always buzzing with people.

Figure 4.15: The Market

Markets are widespread spatial typologies in Kigali, with each community comprising of at least one market. The latter unites both craftmakers and buyers, and fosters engagement among the members of the community.

Figure 4.16: The industrial area/ wetland

This area serves as a hub for various activities in addition to the industrial practices. The area serves as a gathering place for workers, food sellers, moto-taxi and other members of the community.

Figure 4.17: The mobile kiosk

Located within every 50-100m, mobile kiosks are the most common, if not the only way used by the inhabitants of Kigali to top up their mobile phone credit. These kioks also serve as a gathering space for active conversations.

Figure 4.18: The agricultural wetland

The agricultural wetland gathers planters, farmers, cattle rearers and the inhabitants of the surrounding informal settlement.

4.2 Wetlands as social incubators

Wetland valleys represent substantial hubs for communal activities in Kigali's urban fabric, including agricultural practices, fishery and reed harvest. In several zones, women do their laundry or collect water for domestic use. On a research trip in Kigali, Marwan Ghandour relates:

"In the wetlands, I see multiple women, with their kids playing in their vicinity, ploughing in the fields of corn, taro, cabbage and cassava. In the distance a young man is passing through the wetlands with his buffalo herd. The wetlands constitute a busy productive landscape that serpents the multiple hills of the city."[82]

However, due to a lack of environmental considerations in Kigali's urban developments over the past 20 years, wetlands are experiencing depletion and contamination. Inadequate construction of industrial areas within the wetlands lead to an imbalance in established ecosystems caused by untreated industrial waste and by-products, which eventually leads to soil erosion. Where soil erosion is heavy, there has been a loss of soil fertility, which reduces agricultural productivity, while the accumulation of heavy silt loads in the valleys is reducing river and wetland habitats. Flooding is also a result of the suffocation of the marshlands, which triggers the proliferation of mosquitoes, presenting considerable health hazards.[83]

Furthermore, according to the Kigali State of Environment and Outlook Report of 2013, only 25% of the solid waste generated in the city is disposed of in landfills. Due to the lack of an adequate sewage and waste management system, Kigali's wetlands are very often where common waste and other effluents are discharged, contributing to the contamination of underground water, and potentially potable water.[84] The wetlands also house a large number of informal dwellings, which are considered as a hindrance and as additional contributors to pollution. Inhabitants have been urged to vacate the wetlands and relocate.[85]

Kigali's wetlands bear great social significance, especially to informal dwellers. The Rwanda Environment Management Authority (REMA) conducted a social assessment to understand how the communities use the wetlands, assess their dependence on livelihoods and

82 Ghandour, Marwan. 2016. The urban infrastructure for sustainability: learning from Kigali. Architecture Conference Proceedings and Presentations, 91.

83 2012. Kigali's wetland problem. Produced by CNN. https://www.youtube.com/watch?v=pp-0UwfReeY.

84 2016. "Rwanda: Sewage a Disaster Waiting to Happen in Kigali City." The East African. Accessed November 07, 2017. http://allafrica.com/stories/201602222312.html.

85 Mpirwa, Elisée. 2017. City cracks down on facilities in wetlands. September 14. Accessed October 14, 2017. https://www.newtimes.co.rw/section/read/219887.

their knowledge of the role of wetlands. The results indicate that the surveyed population lives mainly from agriculture, depending mainly on subsistence and commercial crops.[86]

Subsistence crops, commercial crops, livestock feed, fresh water and natural/plant derived medicines were indicated as the main provisioning services. Major natural hazards identified in the wetland area and surroundings are flood events and erosion of the river bank. The population identifies, as the greatest fear, the loss of land when considering restoration of wetlands.[87]

Surface water in the Gikondo and Nyabugogo is mainly used for agricultural purposes, drinking for grazing animals and bathing/recreational use. Groundwater coming from springs is used for drinking and washing purposes, and for everyday domestic purposes. The Gikondo and Nyabugogo Wetlands Systems have national and international significance since both contribute to the Nyabarongo wetland-river syste, that ultimately forms the Akagera River, a major contributor to the Lake Victoria.[88]

Figure 4.19: Transition edges between the informal settlement and the wetland

86 Rwanda Environment Management Authority. 2018. "Detailed Sub-Catchment Management Plans for Gikondo and Nyabugogo Wetland Systems."

87 Ibid.

88 Ibid.

Socio-communal dynamics in Kigali's wetlands

Figure 4.20: Water collection in Kimisagara settlement

Runoff water is directed into the canal from which the community retreives water in jerrycans for domestic purposes. The canal also serves as a place of gathering where all members of the community are brought together by the water infrastructure.

Figure 4.21: Clothes washing in Kimisagara settlement

The water in the canal shown in Figure 3.1 also serves as a resource for clothes washing by the inhabitants of the settlement.

Figure 4.22: Clothes washing in Agatare wetland

The agricultural wetland of Agatare also provides the right infrastructure for clothes washing due to its numerous springs.

Figure 4.23: Motorcycle washing in Gikondo wetland

This activity is very common among the hundreds of thousands of moto-taxis buzzing through Kigali's streets.

Figure 4.24: Kids bathing and cows grazing in the Nybugogo river

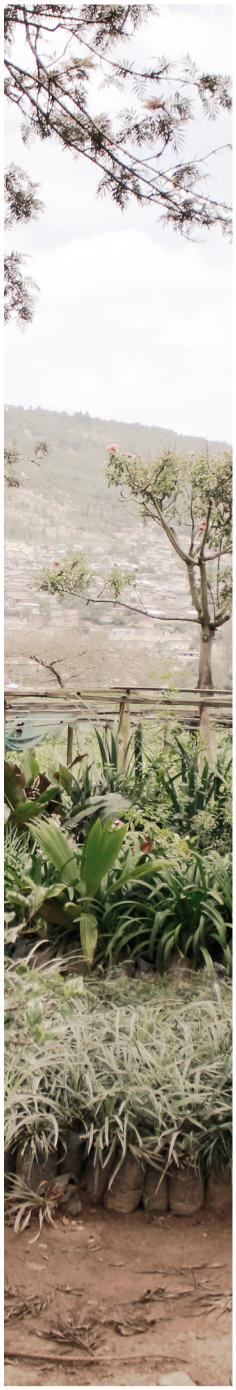
This activity is both recreational and productive where the kids often take the cows to graze, while enjoying a dip in the river.

Figure 4.25: Water collection in Agatare wetland

Natural springs in the Agatare area are considerable sources of water for the community. The water, though not potable, is used widely for domestic purposes.

1. Natural Wetland Vegetation

2. Forest areas, frequently composed by allochthonous tree species, appear to be ecologically stable and complex, presenting several structural vegetation strata



3. Gardened areas, which may play an important ecological role and may support several faunal communities, although they are artificially maintained.

Figure 4.26: Ecologically relevant areas in Kigali's urban wetlands

Farming	**Cultivation** of vegetables and fruits. Use of manure and agrochemicals such as **fertilizers**. Poor agricultural practices leading to **soil erosion.**	*Pollutting substances*	Pesticides Fertilizers (Nitrogen, Phosphorous) Sediments	High contents of pesticides High contents of nutrients Increase of turbidity
Quarrying and mining activities	**Sand/clay mining** for construction or for selling to those constructing. Both formal and informal.		Sediments	Increase of turbidity
Domestic use of water	**Wash** of motorcycles and motor vehicles, washing of clothes and bathing.		Wastewater with oils, detergents, faeces	Increase of Biochemical Oxygen Demand, oils, faecal coliform counts, phosphates and turbidity
Housing wastewaster and disposal of garbage	General no organized sanitation or solid waste management. **Disposal of solid waste** across wetland area.		Faeces and urine Household solid waste	Increase of Biochemical Oxygen Demand, suspended solids and faecal coliform counts
Stormwater run-off from suurounding urban areas	**Runoff** of the city of Kigali is drained to the wetlands with no previous treatment.		Storm water runoff containing oils, sediments and solid waste	Increase of trace metals, oils, suspended soils
Balton Textile factory	Use of **toxic chemicals** to create textiles: polyvinyl chloride to size fabrics, chlorine bleach to lighten a fabric's color, benzidine and toluidine as dyeing agents and flame retardants that are known cancer causing agents. Other toxic chemicals that are used in everyday operations are formaldehyde, lead and mercury. Fabrics are washed and rewashed as they move down the production line so there is an important amount of **wastewater** created.		Wastewater	High contents of trace metals (Hg, Pb), chloride, organic compounds
Kabuye Sugar factory	Sugar mills consume around 2000 liters of water and generate about 1000 liters of waste-water per tonne of cane crushed. The **effluent** is floor washing waste water and condensate water, with sugarcane juice, syrup and molasses in effluent. This effluent also contains **suspended solids and oils.**		Wastewater	High concentrations of biochemical oxygen demand, and oils Increase of turbidity
Gikondo Industrial Park	The predominant business type in the industrial zone is **warehousing or storage space.** The actual industrial units are very few relative to the other business, and they are highly underutilized. The storage of transformers in the open and over bare soil has led to the **leak of oils** that now pervade the area. Other industries include **food processing, mining treatment, plastics and rubber retread, earth brick and tile manufacture, tobacco manufacture, foam mattresses, paint and furniture manufacture, coffee processing and paper industry.**		Wastewater, spillage, soil waste, Faeces and urine	High concentrations of trace metals, oils, biochemical oxygen demand, etc.
Gatsata garages	Activities practiced in the Gatsata Garages were responsible for **hazardous oils and heavy metals** directly entering the Nyabugogo wetland because they lacked the proper infrastructure for waste disposal. Furthermore, most of the garage operators did not have toilets. Presently most of these garages have been **relocated**.		Wastewater and solid waste	High concentrations of oils, trace metals, faecal coliform counts
Utexrwa	Residual waste water containing **dyes and chemical residues** such as hydrogen peroxide and sodium silicate are discharged into the Kagugu river. Pre-treatment facility is in disuse. Certain used dyes are known to be **carcinogenic**.		Wastewater	High concentrations trace metals, high organic load and biochemical oxygen demand
Sulfo Rwanda	Emission of residual **toxic oils, grease, emulsified fats contaminating water and soils**. Sickening odor and health hazard around residential areas.		Wastewater	High concentrations of Chemical Oxygen Demand, organic chemicals, heavy metals, suspended solids, and cyanide
Tolirwa and Safintra	Discharge and **heavy metals and chrome salts.**		Wastewater	High concentrations of Biochemical Oxygen Demand, Chmical Oxygen Demand, oil,metals, acids, phenols and cyanide
Bralirwa	Residual water with **toxic waste** (alcohol residues, yeast, and soda ash). Sickening odor, risk of transmission of diseases, depletion of oxygen in receiving water body, contamination of soil and water with biological contaminants and organic pollutants, other chemicals.		Wastewater	High concentrations of Biochemical Oxygen Demand, organic compounds and coliform counts
Ameki Color	Residual waste water containing a variety of **oils and chemical residues** is discharged to the environment, contaminating soils, and water		Wastewater	High concentrations of oils, suspended solids
Mironko Plastic Industries	Production of plastics requires treatments with several types of **chemical substances**.		Wastewater	High concentrations of Chemical Oxygen Demand, organic chemicals, heavy metals, suspended solids, and cyanide
Ovibar	**Waste** discharged into adjacent residential area. Sickening odor. **Contamination of soil.**		Wastewater	High concentrations of Biochemical Oxygen Demand, organic compounds

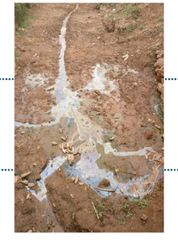


Figure 4.27: Table showing the sources of wetland pollution and associated contaminants

4.2.1 Wetland restoration and regulation

The government aims to transform Rwanda from a low-income agriculture-based economy to a knowledge-based, service-oriented economy with a middle-income status by 2020. Subsequently, some of the existing business and industries currently present in the wetlands have already been relocated so that the latter can be restored. While wetland rehabilitation has been a consideration in the Kigali Conceptual Master Plan, the various proposed wetland parks do not address the abovementioned issues effectively. Indeed, the master plan in no way accounts for the biophysical conditions of the site, and presents a radical approach towards wetland revitalisation.

Instead of working with the existing cultural dynamics, the plan proposes a completely disembodied scheme; according to the visuals of the plan, the agricultural fields currently located in the wetlands have been replaced by entertainment ponds and opulent parks.[89] These designs will greatly affect local agricultural productivity, which will in turn heavily impact on the community, both socially and economically. The modern, awe-inspiring parks presented by the various master planning reports only accommodates the 'elite' dimension of society, resulting in alienation of the middle and lower classes.

Nemus, a Portuguese company offering global services as an answer to sustainable development challenges, has also established detailed management plans for the restoration of Kigali's wetlands, in partnership with REMA. Nemus mentions accounting for a *'detailed and ecologically friendly'* wetland restoration, while taking into consideration cost-benefits and community involvement through workshops.[90] The details about the implementation of this project are still awaiting.

Kigali is also at a crucial turning point towards transforming native urbanisation processes into a more regulated framework that requires approvals and permits. One of the main local influencers of national environment policy towards the sustainable management of natural resources is the Rwandan Environment Management Authority (REMA). In addition, the Ramsar Convention on Wetlands is currently being set up in Rwanda, with the aim of providing the framework for national action and international cooperation for the conservation of wetlands and their resources. Furthermore, the *Organic Law on Environment Protection and Management* has been developed by REMA to

89 Oz Architecture. 2007. Kigali Conceptual Master. Kigali, Rwanda.

90 Nemus. 2017. New project in Rwanda: Restoration of Wetlands in the Kigali City – Sub-catchment of Gikondo and Nyabugogo. Accessed November 07, 2017. http://www.nemus.pt/en/new-project-in-rwanda-restoration-of-wetlands-in-the-kigali-city-sub-catchment-of-gikondo-and-nyabugogo/.

protect untouched landscapes and to impose control on marshland development and was established in 2009.[91]

While laws are being enacted to establish control, it is crucial to also take into consideration the means of their implementation, and how mindful design can facilitate the practice of legal frameworks in a more adaptive and responsive manner.

Figure 4.28 (previous page): Agricultural wetlands amidst Kigali's grappling informality

Figure 4.29: Corn selling and moto in wetlands

91 Tsinda, Aime. 2011. Policies, Regulations and Institutional Framework for Improved Sanitation in Kigali: Rwanda Public Policy Observatory Report 2. Kigali: Institute of Policy Analysis and Research - Rwanda.

Figure 4.30: Informal dwellings and subsistence crops in wetlands

Figure 4.31: Pottery and crafts in wetlands

Figure 4.32: Agriculture and cattle rearing in wetlands

Figure 4.33: Industrial areas in wetlands

5

CULTIVATING THE PARADOX

Figure 5.01 (previous page): Informal dwelling overlooking Agatare wetland

Following the observations carried out through the previous chapters, this thesis aims at addressing four key issues:

1. The considerable lack of equity and inclusiveness towards the lower stratum of society, in view of the prevailing urban developments
2. The severe degradation of Kigali's wetland ecosystems
3. The lack of adequate water quality available for informal dwellers
4. The lack of inclusive public space catering for every social class

This chapter explores the design strategies that shall be used to establish a more democratic approach to urban planning within Kigali's urban fabric.

5.1 "Make+shift"

The essence of socially inclusive design approaches in emerging cities lies in cultivating the unique intricacies of the urban realm. The idea of the "Make+shift" city was established by Alexander Vasudevan, who asserts that informal urban life is made up of a dense matrix of practices that are central to how squatted spaces and communities are pieced together.[92] To speak of a makeshift urbanism is therefore to acknowledge the constantly changing role of materials and resources in the making of such spaces. It is also to shift attention to aspects of urban life that serve as a platform for rethinking how we, as architects and urban planners, understand the city as a site of endurance and social transformation.[93] This thesis hence favours an agency of design tailored for impermanence and constant renewal over time, bearing in mind the perpetual fluctuation of the types of activities that take place within pockets of informality.

The observations carried out by AbdouMaliq Simone and Edgar Pieterse through their book "New Urban Worlds – Inhabiting Dissonant Times" will also serve as key foundations for the design schemes elaborated throughout this thesis. Simone and Pieterse define the city as an assemblage of 5 operating systems: infrastructure, the economy, land, governance and cultural systems.[94] The authors also put forward that, in urban realms led by unjust governance, infrastructure is used as a means of control, a political force

92 Vasudevan, Alexander. 2014. "The makeshift city - Towards a global geography of squatting." Progress in Human Geography 39 (3).

93 Ibid.

94 Simone, AbdouMaliq, and Pieterse, Edgar. 2017. New Urban Worlds. Cambridge, UK: Polity Press.

in itself.[95] Verily, they express how the level of infrastructure available to a certain segment of society directly affects their actions, power and knowledge. Infrastructure establishes specific channels of interaction: as much as infrastructure bears the power of linking communities, it also has the capacity of creating boundaries and forcing them into complete isolation, thus rendering the poor as easy targets of developments and manipulated pawns in a game.[96]

The work presented in this thesis hence capitalises on the political power of infrastructure in order to breathe a new life into informal communities. As established through Chapters 1 & 2, Rwanda has been exposed to very controversial and sensitive political conditions all throughout its history, conditions which are still prevailing to this day. By creating an autonomous and egalitarian character to informal urban infrastructure, this work gives communities a means of standing on their own feet, a means of independence amidst oppression. Allowing informal dwellers to manage their own water systems, to connect with their landscapes, and to generate their own small economies, fosters engagement, which in turn induces a feeling of belonging and affiliation with the other large-scale developments happening across Kigali.

"Urban transformations are most likely to arrive when ordinary citizens amplify their abundant agency, rooted in the dense everyday politics of livelihood and spirituality, to make connections with city-wide agendas, which are most potent in the form of infrastructures and symbolic circuits of meaning."[97]

Rwanda is also a state where voicing out is extremely polemical and discussing negative political opinions can be severely condemned. However, this does not mean that the political situation should be disregarded in the design approach. Doherty states: "When architecture is decontextualized from the political contexts of power that shape society, it can present a distorted view that, despite its best intentions, has the innate ability to depoliticise and dehumanise conditions." [98] While openly protesting against seclusive developments is not favoured in the case of Rwanda, design has the power to act as a subversive form of challenging the customary political practices. The infrastructural systems established through this thesis not only humanise informal dwellers, but also give them the power of acquisition over a given structure, thus claiming their rightful place within the urban fabric. This ap-

95 Ibid.

96 Ibid.

97 Simone, AbdouMaliq, and Pieterse, Edgar. 2017. New Urban Worlds. Cambridge, UK: Polity Press.

98 Doherty, Killian. 2016. "Drone Ranger: complexity and contradiction in Rwanda." Architectural Review.

proach, as expressed by Simone and Pieterse[99], is referred to as 'grounded politics', which is a concept that pays attention to both popular everyday practices, and to the more systematic organisation and advocacy of democratic social movements of the city.[100]

Accordingly, amid a context where the capacity to resiliently reinvent on a constant basis has become standard generating procedure, this work elaborates practices that weave interconnections among various systems of engaging different urban actors within highly circumscribed and uncertain contexts.

5.2 Biodiversity as a regenerative tool

The aforementioned conditions also present opportunities for designers to develop innovative alternatives that integrate urban and landscape infrastructure with rooted construction practices. This unified approach would not only attenuate existing environmental problems but will also trigger the engagement of Kigali's residents on a social, environmental and cultural level.

The term 'landscape urbanism' is a term that was put forward in 2006 by the architect and urbanist Charles Waldheim, who states that "*landscape has become a lens through which the contemporary city is represented and a medium through which it is constructed."*[101] Based on this concept, landscape infrastructure presents the next steps for further inquiry, since, as articulated by Ying-Yu Hung, a city's development and economic future is in direct proportion to its ability to collect, exchange, distribute goods and services, resources, knowledge and resources across vast territories.[102]

Claire Lyster rightly argues that present-day typical infrastructure - transportation, communications systems, water and power lines - constitute a very rigid system, conceived for a single purpose and which quickly become obsolete and reinvented, highly influenced by global geopolitical and economic forces.[103] Landscape infrastructure proposes a more versatile approach, which redefines the system of infrastructure with new paradigms that are more aligned to the natural systems of ecology. [104] Ying-Yu Hung defines

99 Simone, AbdouMaliq, and Pieterse, Edgar. 2017. New Urban Worlds. Cambridge, UK: Polity Press.

100 Ibid.

101 Waldheim, Charles. 2006. "A Reference Manifesto." Edited by Charles Waldheim. The Landscape Urbanism Reader (Princeton Architectural Press) 15.

102 Hung, Ying-Yu. 2013. "Landscape Infrastructure: Systems of contigency, flexibility, and adaptability." In Landscape Infrastructure - Case Studies by SWA, by Multiple Authors, 14-19. Basel: Birkhauser.

103 Lyster, Claire. 2006. "Landscape of Exchange: Re-Articulating Site." Edited by Charles Waldheim. The Landscape Urbanism Reader (Princeton Architectural Press) 226.

104 Hung, Ying-Yu. 2013. "Landscape Infrastructure: Systems of contigency, flexibility, and adaptability." In Landscape Infrastructure - Case Studies by SWA, by Multiple Authors, 14-19. Basel: Birkhauser.

the term by the means of four characteristics: *performance* through a non-isolated system, *aggregates* constituting a remediating collective, a *network* instilling connection and purpose, and *increments* that perpetually sustain growth.[105]

Based on those grounds, this thesis capitalises on informal landscapes as a backbone for a decentralised network of urban interventions, where slopes and wetlands shall be adopted as incubators of social, economic and environmental transformation. This network shall ultimately act as a connecting thread through the urban fabric, towards a unifying approach, while also showing how socio-cultural and bio-physical infrastructure can act as a means of political engagement.

105 Ibid.

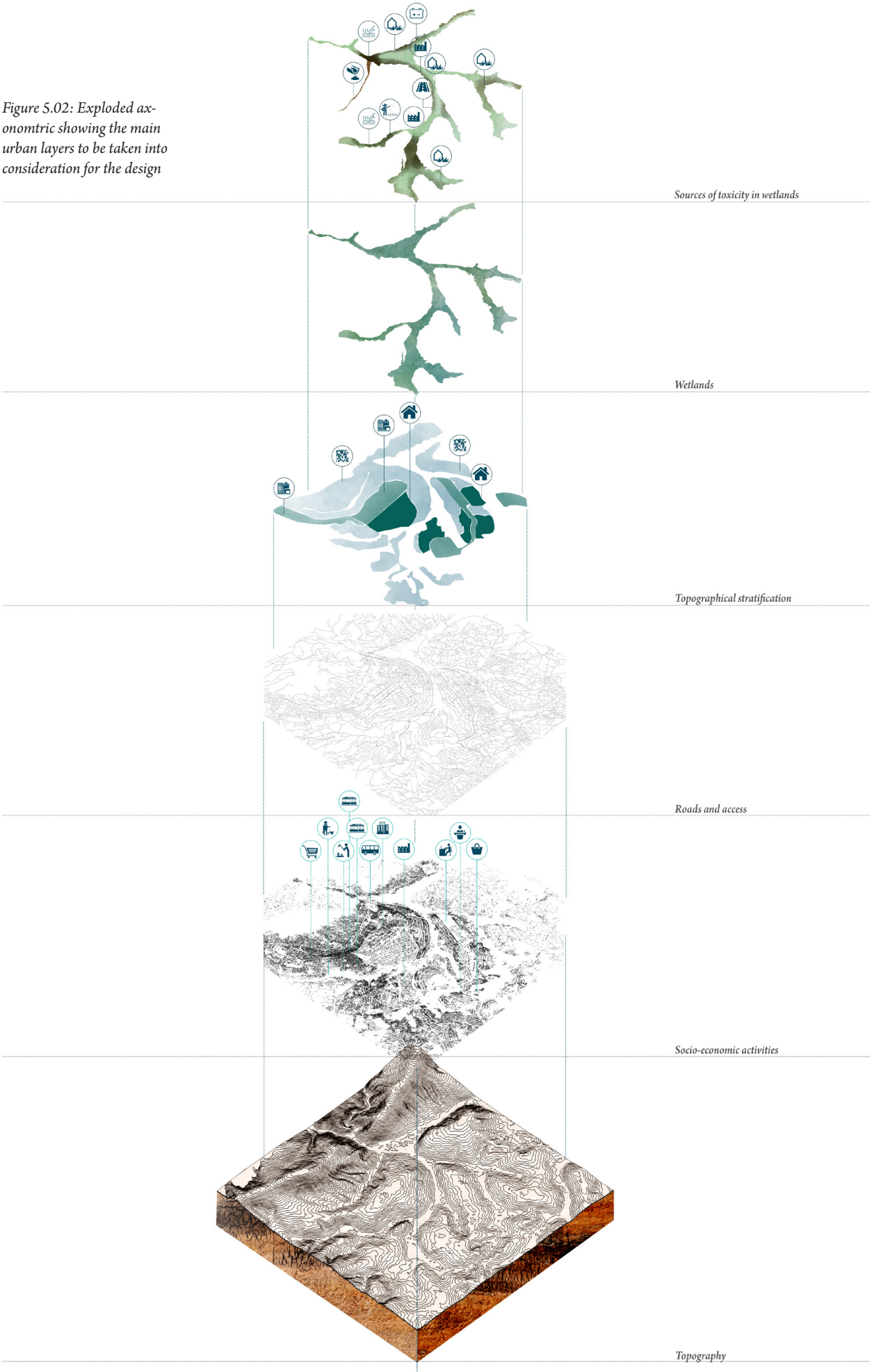


Figure 5.02: Exploded axonomtric showing the main urban layers to be taken into consideration for the design

5.3 Towards a new contextual framework

'Incremental Urbanism' is a concept that was initially established during the Italian Renaissance[106], a concept which architectural historian Joseph Connors describes as establishing a piazza here, designing a new facade there, placing a door to align with a street, straightening a street or bending it towards a monument.[107] Incremental urbanism enables the city to develop as individual occupants or builders navigate rapidly changing environments with scarce resources – the building process is continuous responding to available skills, materials, culture and resources. Such construction result in a multitude of innovations which might seem random but actually constitute refined and effective response.

In the light of what has been discussed previously, this section establishes a framework that will stimulate contextually-appropriate design approaches throughout the inscribed thesis process. The intent behind the strategies presented in this section will be to break away from top-down, radical, *Tabula Rasa* approaches as presented previously by the set of masterplans currently implemented in Kigali, while maximising the potential of the city's wetlands.

The central role of wetlands has been at the core of several developmental frameworks. Such a need has been hailed by Haines[108] who highlighted the complexity of wetlands dynamics, and proposed an incremental approach to map hydrodynamic modelling of wetlands. This author posited that such an approach will offer a pathway to wetland restoration with lesser risk and uncertainty. The risks associated with urban land use near wetlands have been linked to increased runoff and peak flow together with enhanced loss of biodiversity for plant and animal species holding key roles in the wetlands ecosystems.[109] Such risks call for consideration of sustainable urban development. It has been observed that wetlands are highly sensitive ecosystems and development in eco-social landscapes may trickle down to unforeseen ecological transformations; both in composition and regarding the structure of wetlands in relation to the social setting.[110] Altogether, it has been noted that the three main causes of such changes are hydrological modification, watershed urbanisation and changes in ecosystem use.[111]

106 Mayernik, David. 2003. Timeless Cities: An Architect's Reflections on Renaissance Italy. Cambridge, MA: Westview Press

107 Connors, Joseph. 1980. Borromini and the Roman Oratory: Style and Society. MIT Press.

108 Haines, Philip. 2013. "Hydrological modelling of tidal re-inundation of an estuarine wetland in south-eastern Australia." Ecological engineering 79-87.

109 Adegun, Olubunmi, Odunuga Shakirudeen, and Youpele Appia. 2015. "Dynamics in the Landscape and Ecological Services in System I Drainage Area of Lagos." Ghana Journal of Geography 75-96.

110 Hettiarachchi, Missaka, Tiffany H Morrison, Deepthi Wickramsinghe, Ranjith Mapa, Ajith De Alwis, and Clive McAlpine. 2014. "The eco-social transformation of urban wetlands: A case study of Colombo, Sri Lanka." Landscape and Urban Planning 55-68.

111 Ibid.

Centered around ecological rehabilitation, this thesis proposes a framework that goes way beyond architectural and environmental dynamics. The latter primarily serves to foster the perpetually evolving, makeshift, urban patterns embedded within Kigali's urban fabric, through the involvement of a panoply of urban actors, ranging from informal dwellers, to researchers, scientists and students. Architects and other urban decision-makers are set to act as mediators, as facilitators towards triggering a community in action. The framework establishes an extensive set of premises, where the design presented in section 5.5 demonstrates a segment of the components required for a more inclusive and democratic urban realm. The design strategy unfolds by testing an established design framework on 3 main sites, and eventually a 4th proposed node to demonstrate the framework's adaptability to any wetland site throughout the city.

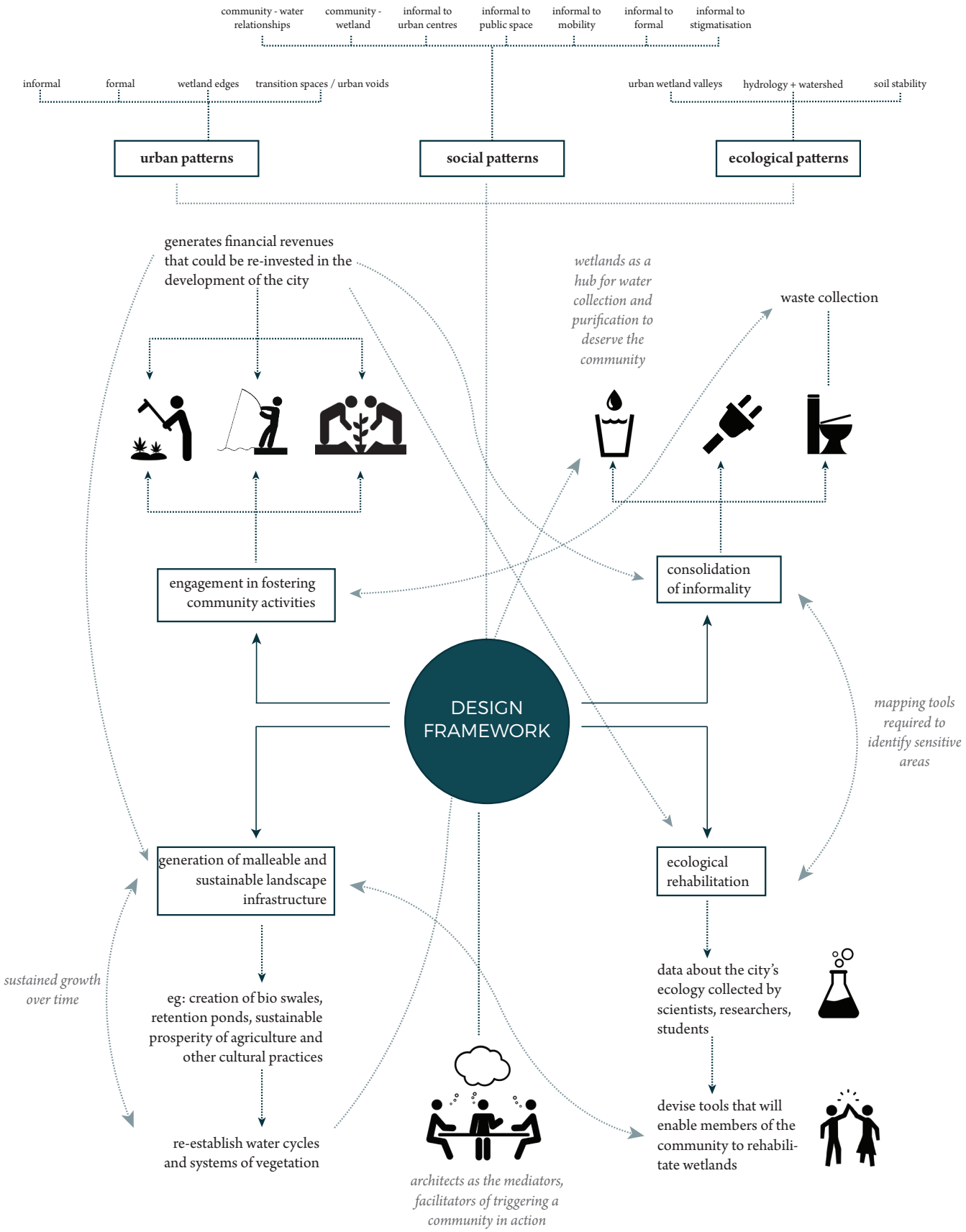


Figure 5.03: Proposed thesis design framework

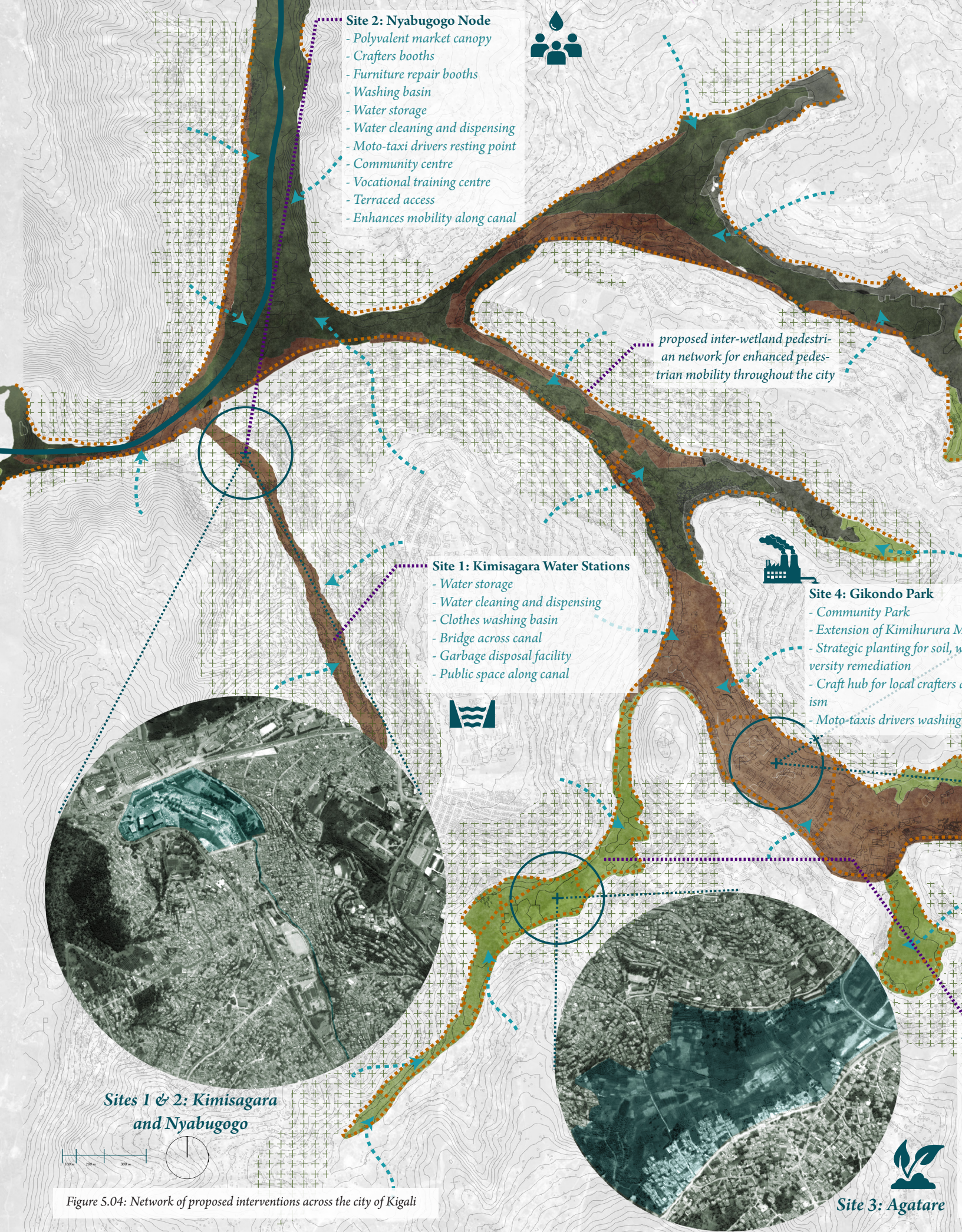


Figure 5.04: Network of proposed interventions across the city of Kigali

run-off water movement

pedestrian network

informal residential areas

Proposed Site 4: Gikondo

Market
water, and biodi-

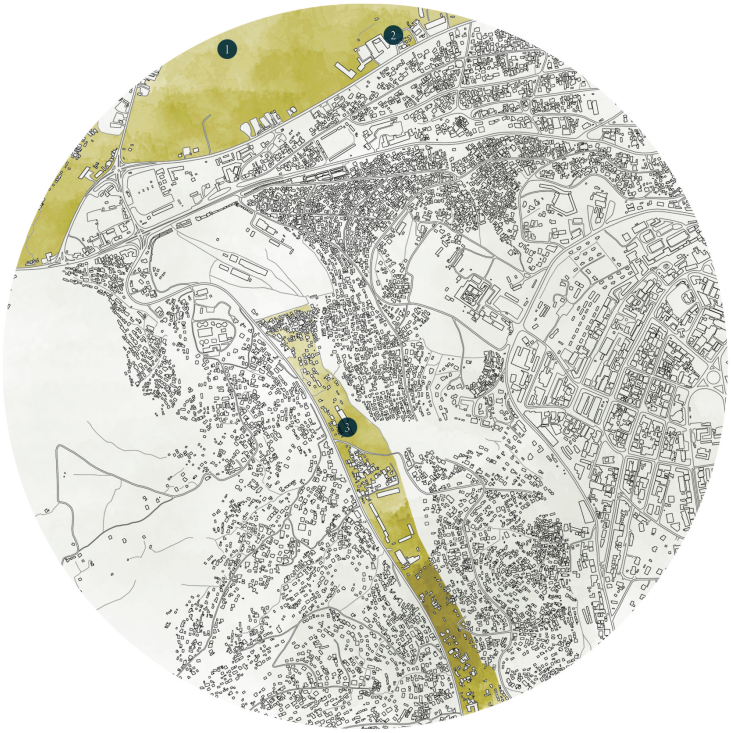
and to foster tour-

and resting point

Site 3: Agatare Agricultural Weltand

- Run-off water filtering though bio-swales
- Water storage through water retention points
- Water filtering and dispensing
- Irrigation
- Composting gardens
- Boardwalks to facilitate pedestrian mobility through wetland

Site 1 & 2: Nyabugogo and Kimisagara



Current Land Use Conditions :

1. Agriculture
2. Industrial
3. Informal Settlement

Challenges:

- Toxicity from industrial areas
- Polluted water from drainage
- Cemented wetland
- Roads
- Access

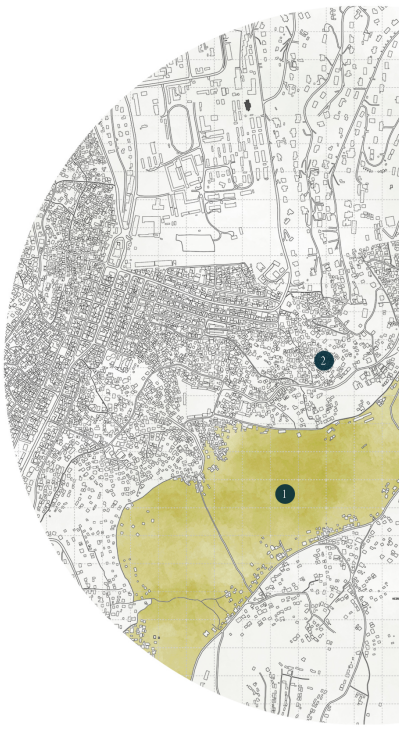
Activities:

Industries	Plant nurseries	Water collection
Depots	Washing of vegetables	Institutional (church, school, football centre)
Agriculture	Washing of clothes and shoes	Informal selling of sofas

Principal actors / Stakeholders:

- Informal dwellers/low income earners
- Middle income earners

Site 3: Agatare / Rwampara Wetland and Infor



Current Land Use Conditions :

1. Agriculture
2. Informal Settlement

Challenges:

- Encroaching
- Polluted water from drainage

Activities:

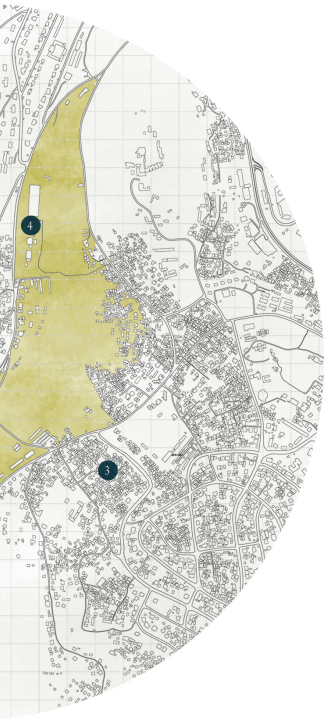
Agriculture - mainly commercial (corn, taro, banana)	Cattle rearing
Sports centre	Institutions (schools,
Industries	

Principal actors / Stakeholders:

- Informal dwellers/low income earners

Figure 5.05: Site profiles table

nal Settlement



Potential Site 4: Gikondo Industrial Park

Current Land Use Conditions :

3 Informal Settlement

4 Recreational area and sports centre

1 Industrial

2 Informal Settlement

3 Formal Residential

4 Mix of informal and commercial

Challenges:

Roads

Soil erosion

Fertilisers from agriculture

Toxicity from industrial areas

Roads

Polluted water from drainage

Access

Activities:

community and health centres)

Industries
Depots
Agriculture (principally corn)

Corn selling
Informal businesses (hair salons, video clubs)
Formal businesses

Principal actors / Stakeholders:

Informal dwellers/low income earners

Middle income earners

Expats

5.4 The Proposal

5.4.1 Site 1 – Kimisagara Water Stations

The first site chosen for intervention is the Kimisagara informal settlement, which is the largest informal settlement in Kigali, housing 46,753 dwellers.[112] Part of the informal settlement has actually been constructed within a wetland valley, and the only remainder of the watershed is a cemented six-metre wide canal that runs through Kimisagara. The primary infrastructural role of the canal is to carry runoff water from the hillsides of the informal settlement into the Nyabugogo wetland. But the canal also serves a major social role for the inhabitants of Kimisagara, who collect the run off water flowing into the canal for domestic purposes. These water-related activities centered around the canal renders the latter into a social gathering space; an incubator of informal life. Most of the informal dwellings in Kimisagara do not have running water, and dwellers have to walk fairly long distances to buy water from a water pumping station.

Figure 5.06: Existing Kimisagara canal, where infrastructure is transformed into a socio-communal space

Figure 5.07: Kimisagara water canal with makeshift bridges

112 National Institute of Statistics of Rwanda. 2012. "Fourth Population and Housing Census, Rwanda - District Profile Nyarugenge."

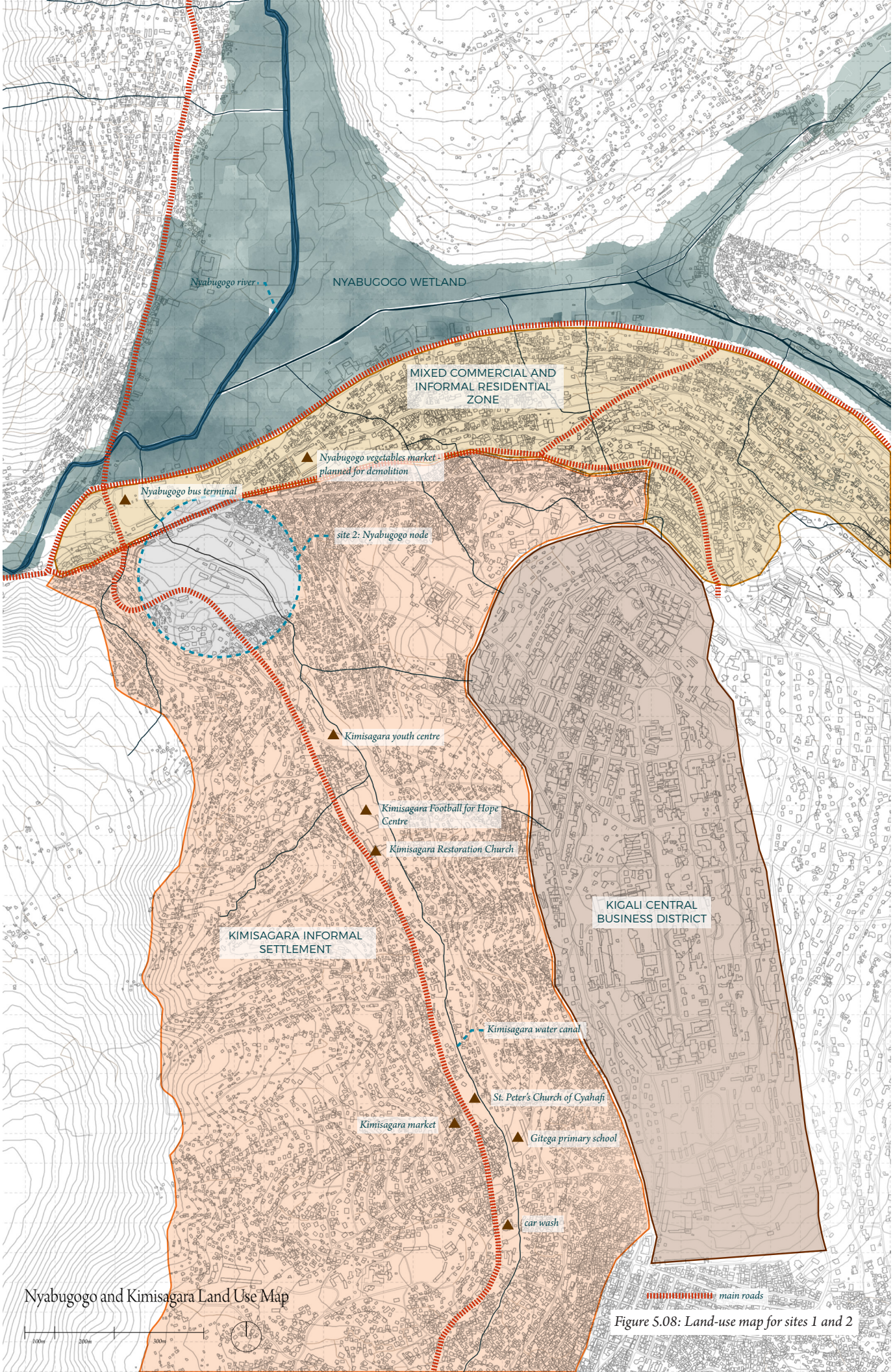


Figure 5.08: Land-use map for sites 1 and 2

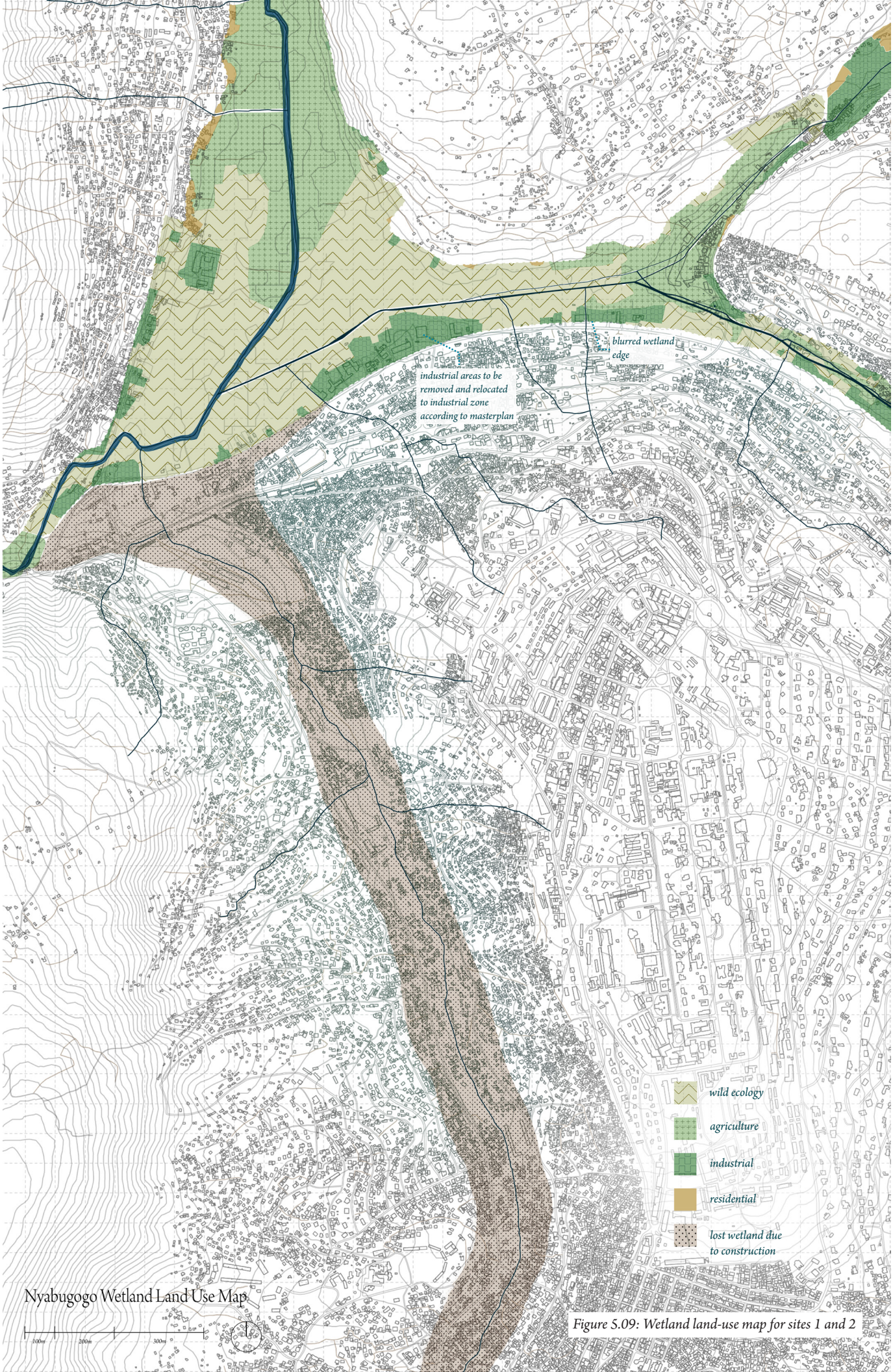


Figure 5.09: Wetland land-use map for sites 1 and 2

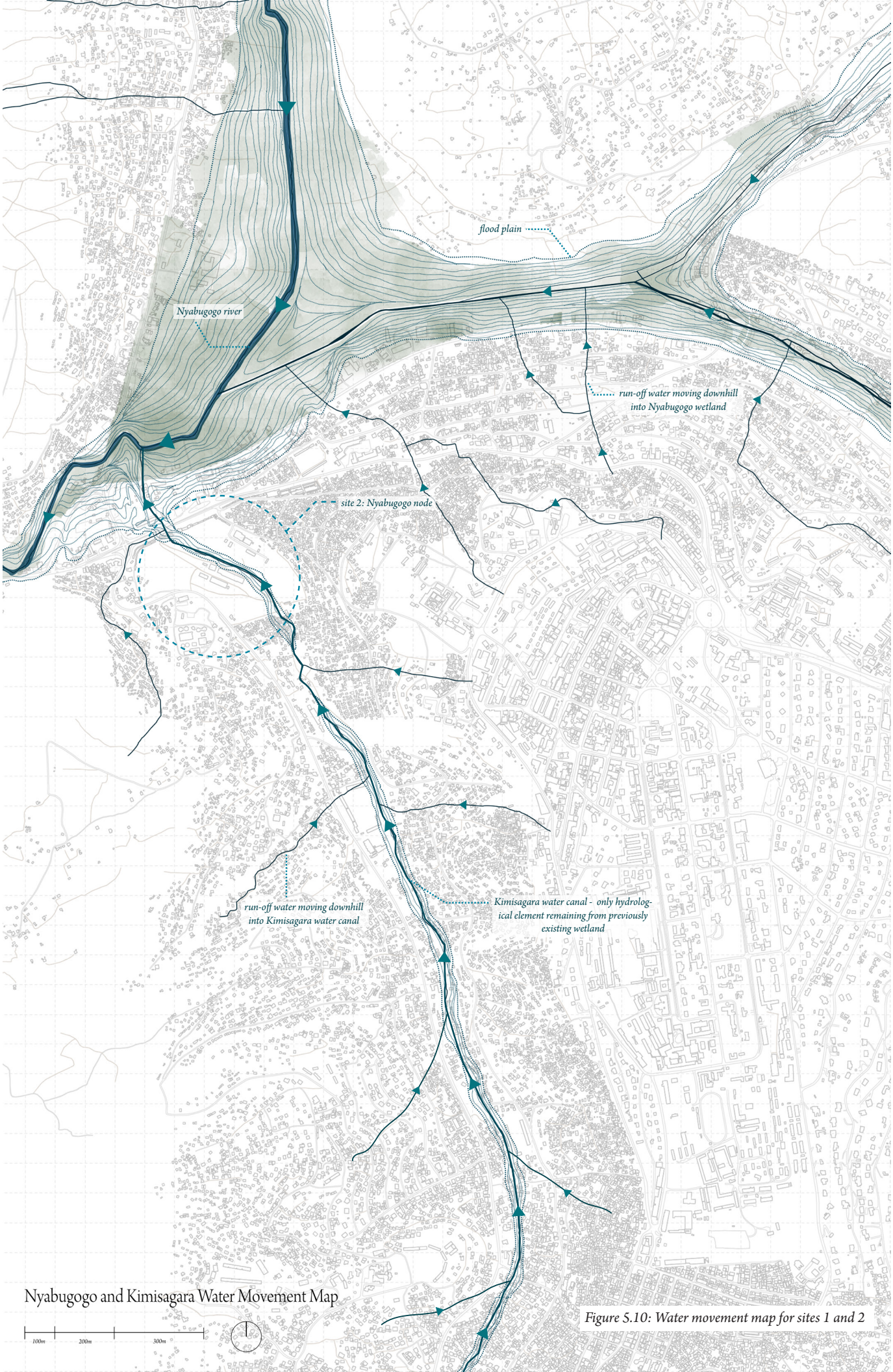


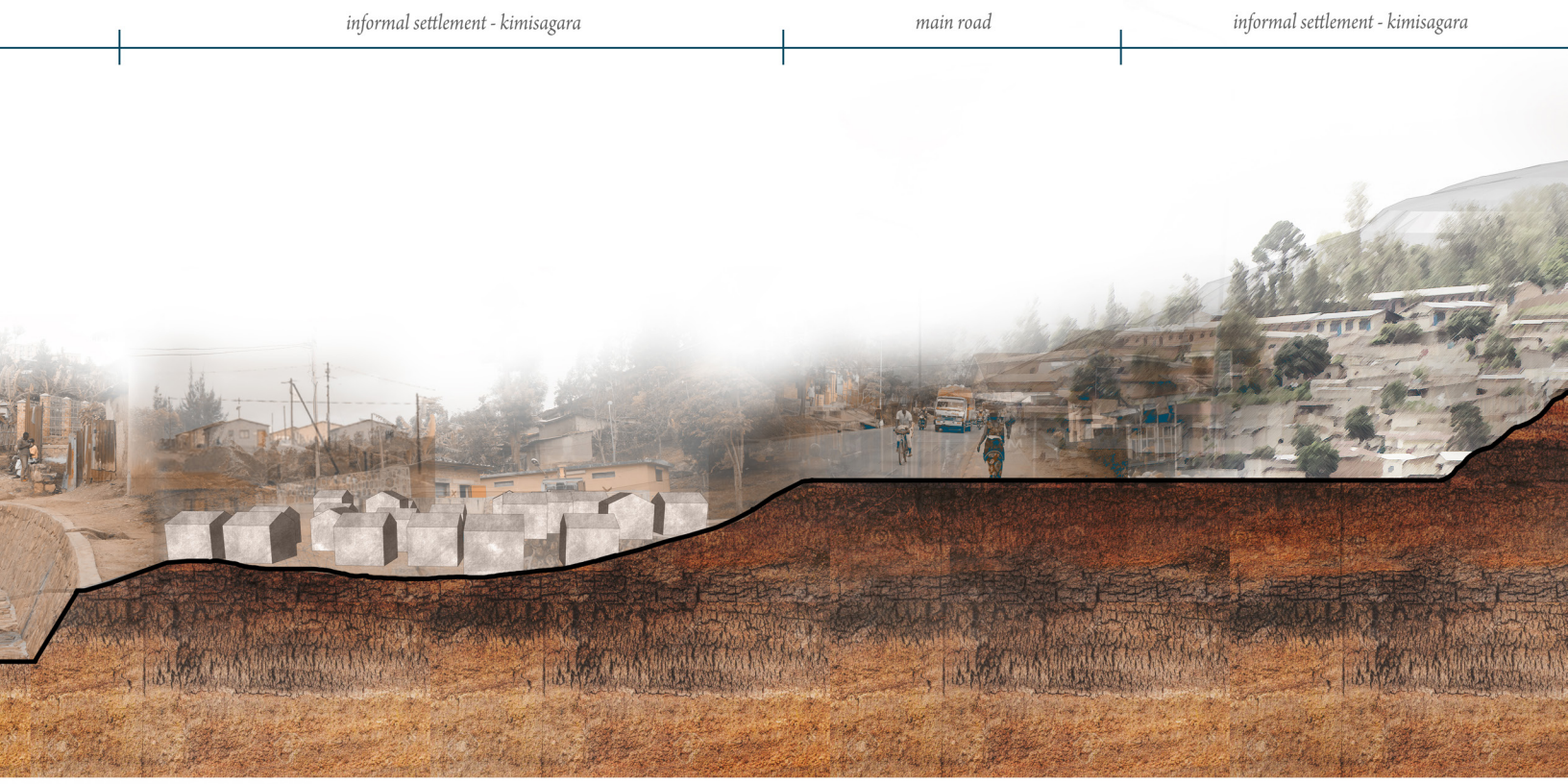
Figure 5.10: Water movement map for sites 1 and 2

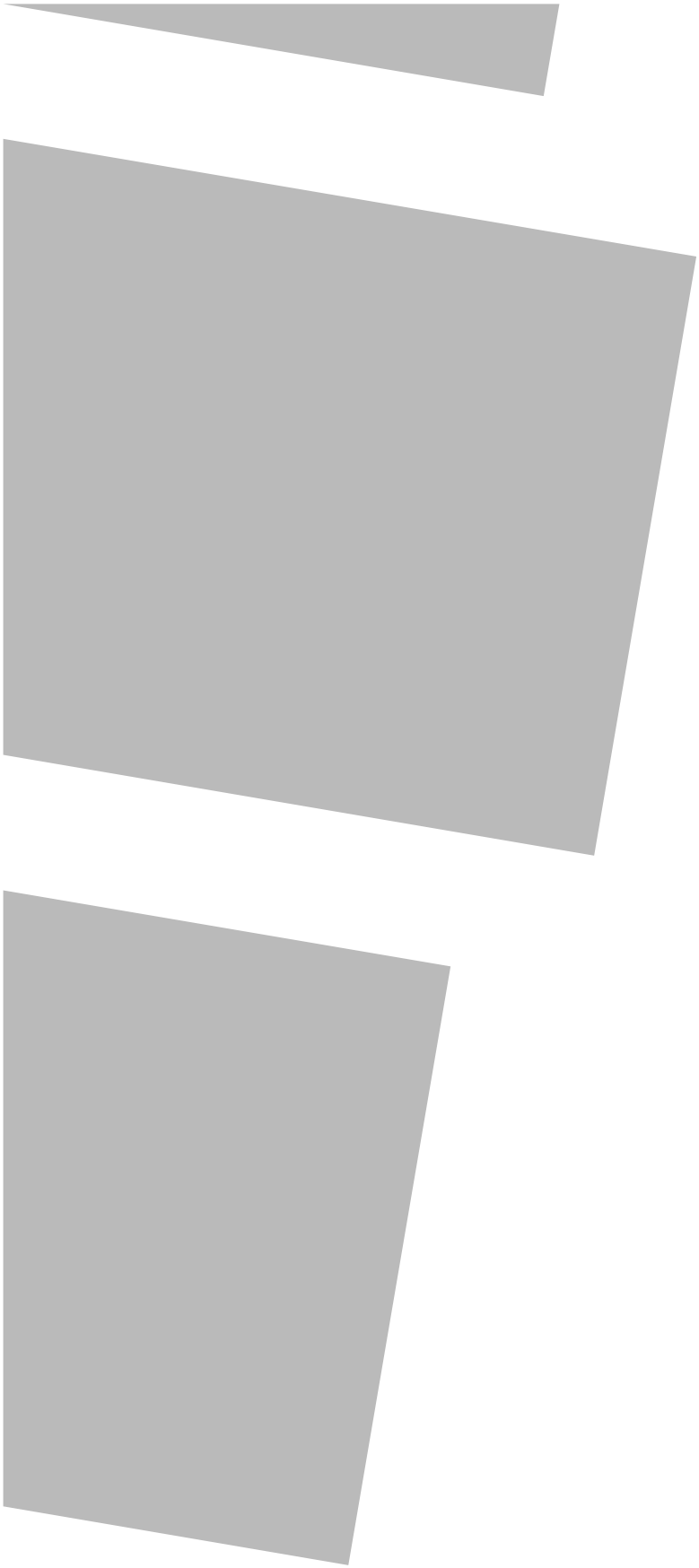
informal settlement - kimisagara

drainage canal

Figure 5.11: Kimisagara canal section - existing conditions

SECTION CUT


informal settlement - kimisagara
main road
informal settlement - kimisagara



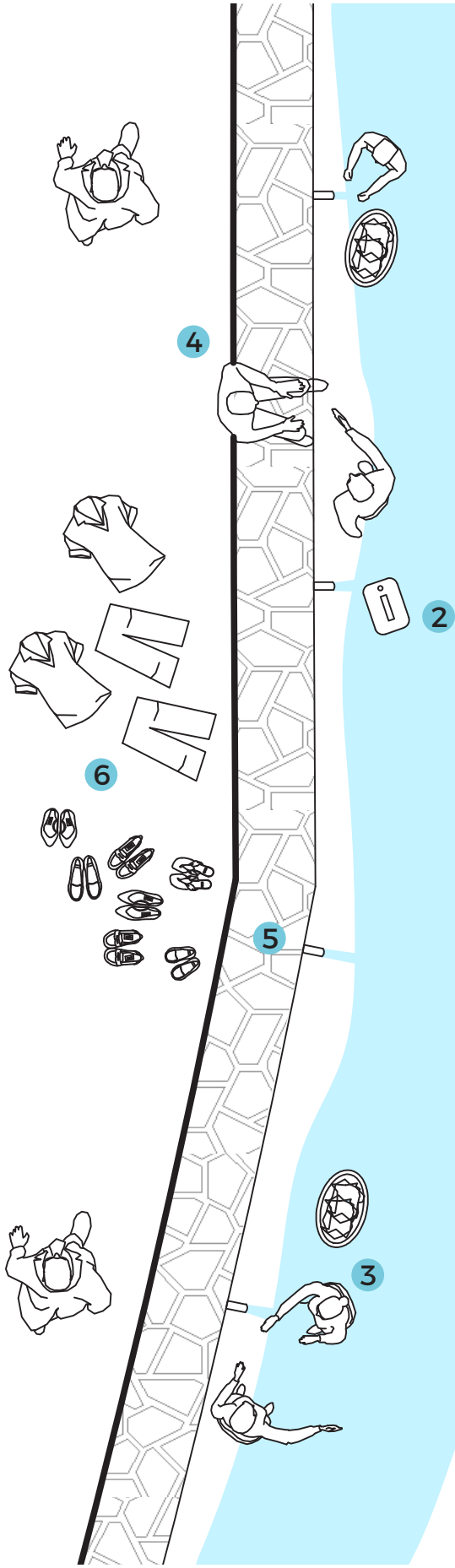


Figure 5.12: Kimisagara canal - plan of existing social dynamics

LEGEND

1. Canal

2. Water collection for domestic purposes in jerrycans

3. Clothes washing

4. Social space

5. Runoff water directed to canal through downspout

6. Clothes and shoes left to dry

The proposed design for this site is a network of 5 water purification stations, all located along the canal within 400 metres of each other for effective pedestrian access. The water station acts like a bridge, linking both sides of the informal settlement, while providing better access along the canal through a continuous public path.

The water station operates as follows: the walls of the canal are used to build a water tank that traps the run-off water from the canal. The water is then pumped through a solar powered pump into water filters. The water filters are bucket-like structures equipped by a durable and low-cost Hollow-fibre Membrane Technology, devised by the organisation Uzima Water Filters.[113] Each water filter contains a bundle of hollow fibers designed to allow water molecules to pass through the filter while anything larger than 0.1 microns (bacteria, cysts, protozoa, etc.) is filtered out. The filters are cleaned simply by flushing out with clean water.[114]

After filtration, the water is stored in the buckets. The user then comes and scans a personal barcode from his smartphone, linked to a personal account on a water-metering application. The latter then dispenses of the water he/she needs and a meter records how much water he/she disposed of. At the end of the month, the users are charged for the amount of water they used over that period of time. The water stations are each equipped with a clothes-washing basin, aiming at providing infrastructure catering to the already existing activities. Water from the tank is also used in the washing basin.

It is also important to highlight that a void channel has been left between the tank and the canal wall to allow for the free flow of excess water, especially during intense rain and flooding. In that way, the proposed design accounts for the need of the continuous flow of water down the canal. The main materials used for the structure of the water station are locally sourced eucalyptus lumber and metal sheets, materials embedded in the vernacular of the informal settlement. Concrete and stone have been used for the water tank and clothes-washing basin to match the existing context. The daily efficiency of the water station has been amounted to a dispensing rate of 7,680 litres per day. The water station is easily managed by members of the community, and hence creates a sense of belonging and ownership to their surroundings.

The proposed design for site 1 establishes infrastructure as a politics of modulation, as a way of bringing volatility to a workable slow motion so that particular projects can materialise.[115] In this case, the water station helps to structure the piecemeal dynamics of activities along the canal in a gradual but productive manner that benefits the surrounding community. Subsequently, this can act as a stepping stone for larger-scale development in view of the revitalisation of informal settlements.

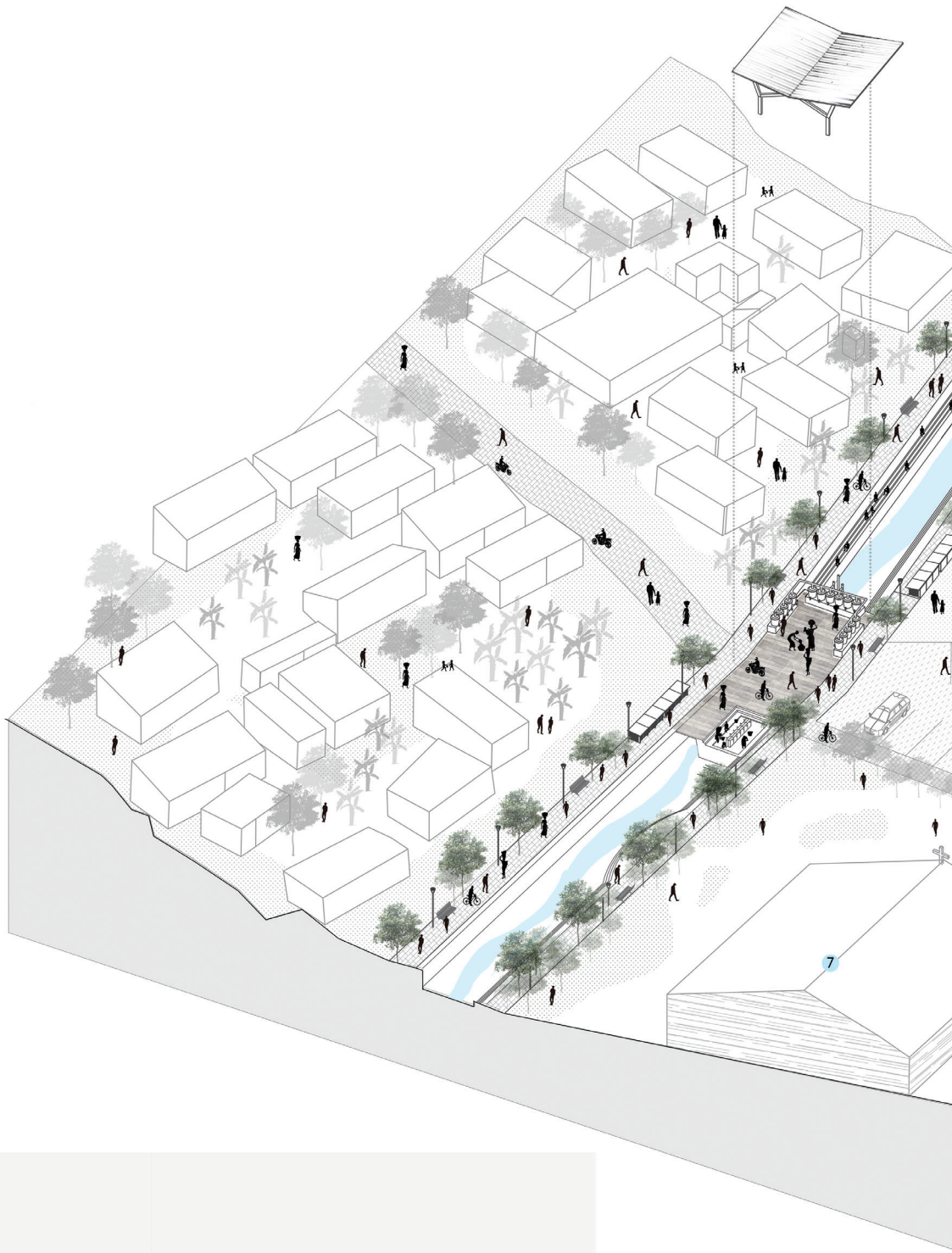
113 Uzima Water Filters. n.d. How our filters work. Accessed July 20, 2018. http://uzimafilters.org/our-products/how-our-filters-work/.

114 Ibid.

115 Simone, AbdouMaliq, and Pieterse, Edgar. 2017. New Urban Worlds. Cambridge, UK: Polity Press.

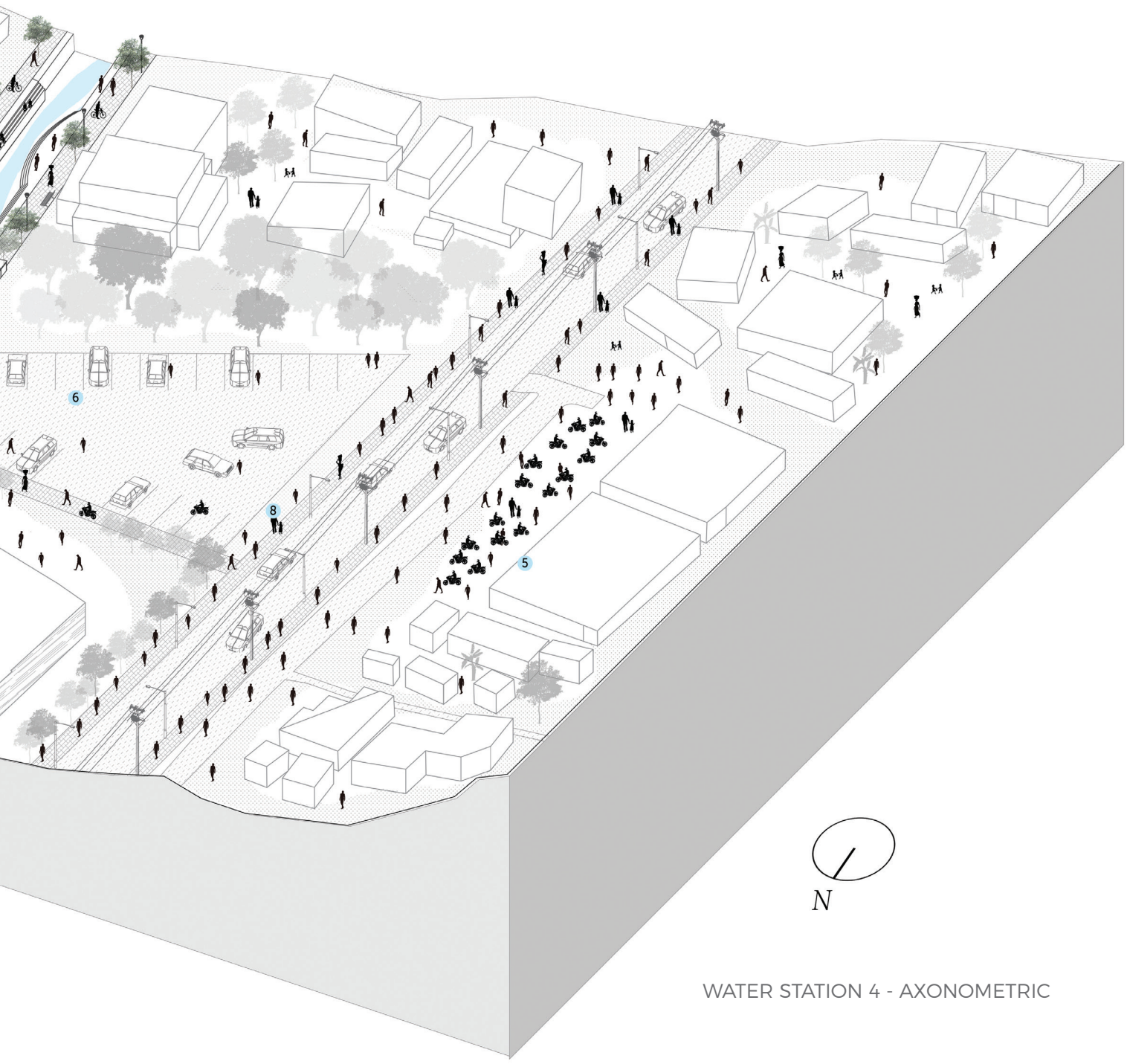
Figure 5.13: Network of water stations along Kimisagara canal

Figure 5.14: Axonometric of one water station node. In this instance, the water station is located next to a church and opposite Kimisagara market, and hence enhances public space around those areas of high activity.

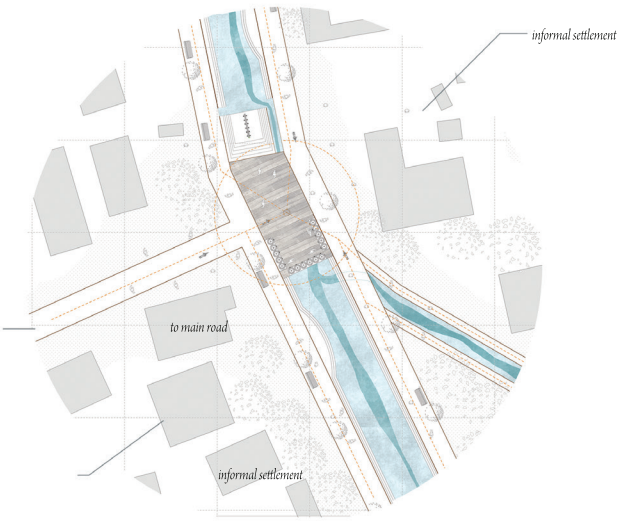


LEGEND:

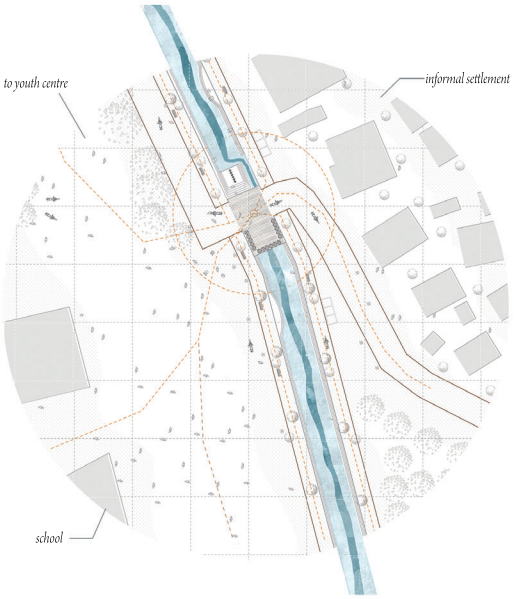
1. Proposed water station design
2. Clothes washing basin
3. Garbage disposal facility
4. Steps for public interaction with canal
5. Kimisagara Market
6. Existing car park
7. St Peter's Church of Cyahafi
8. Main road



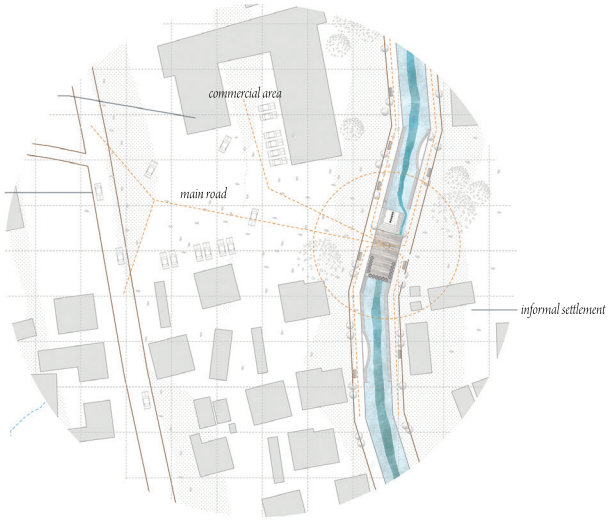
WATER STATION 4 - AXONOMETRIC



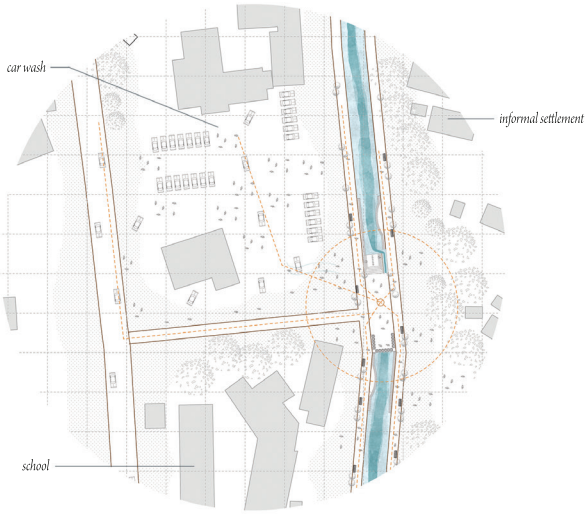
Water Station 1 - converging node between main road and both sides of Kimisagara informal settlement



Water Station 2 - converging node between school, community centre and informal settlement



Water Station 3 - node providing access from informal settlement to commercial area and main road, as well as acting as a gathering space



Water Station 5 - converging node between car wash facility, school and informal settlement

Figure 5.15: Vignettes of the four other proposed water station site and how they affect circulation according to each specific context

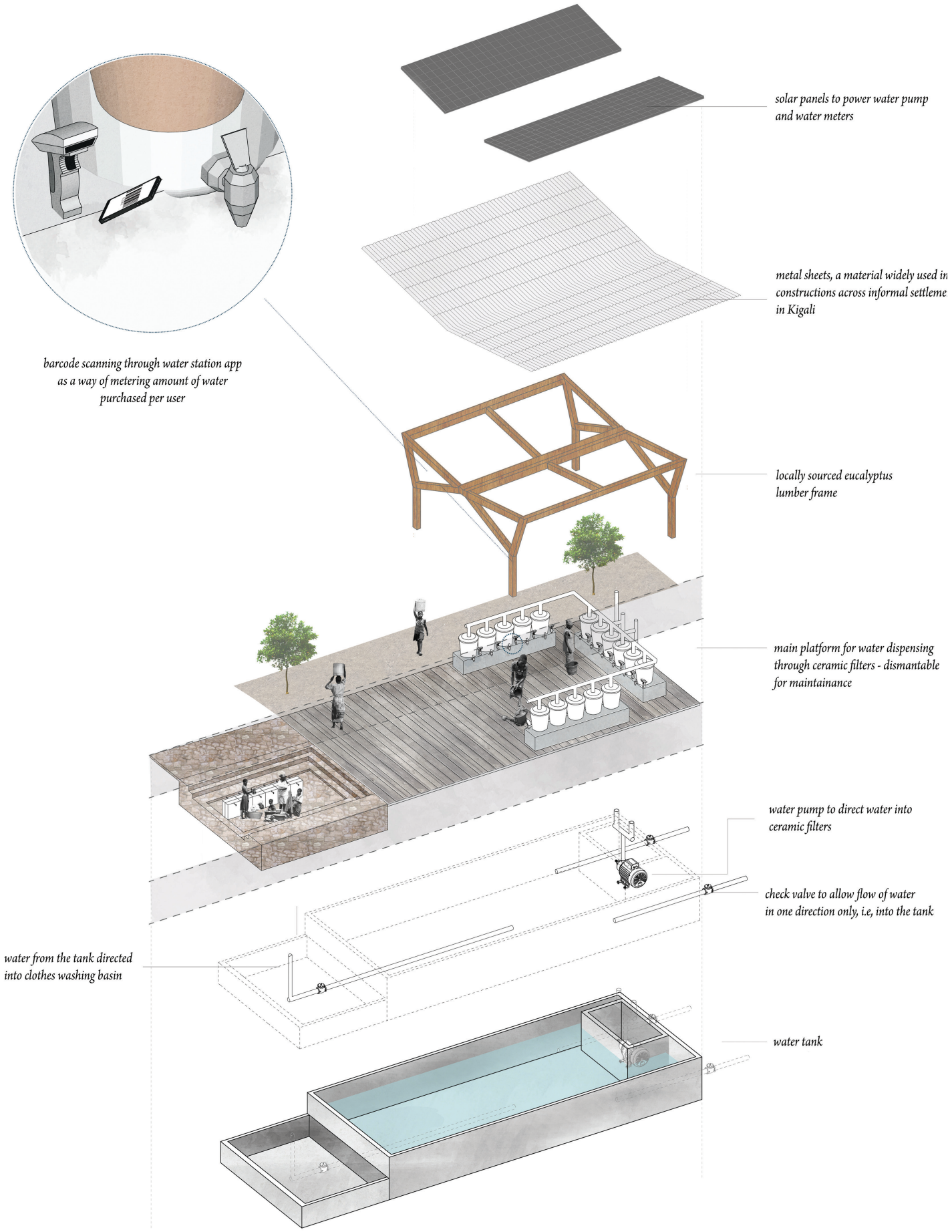
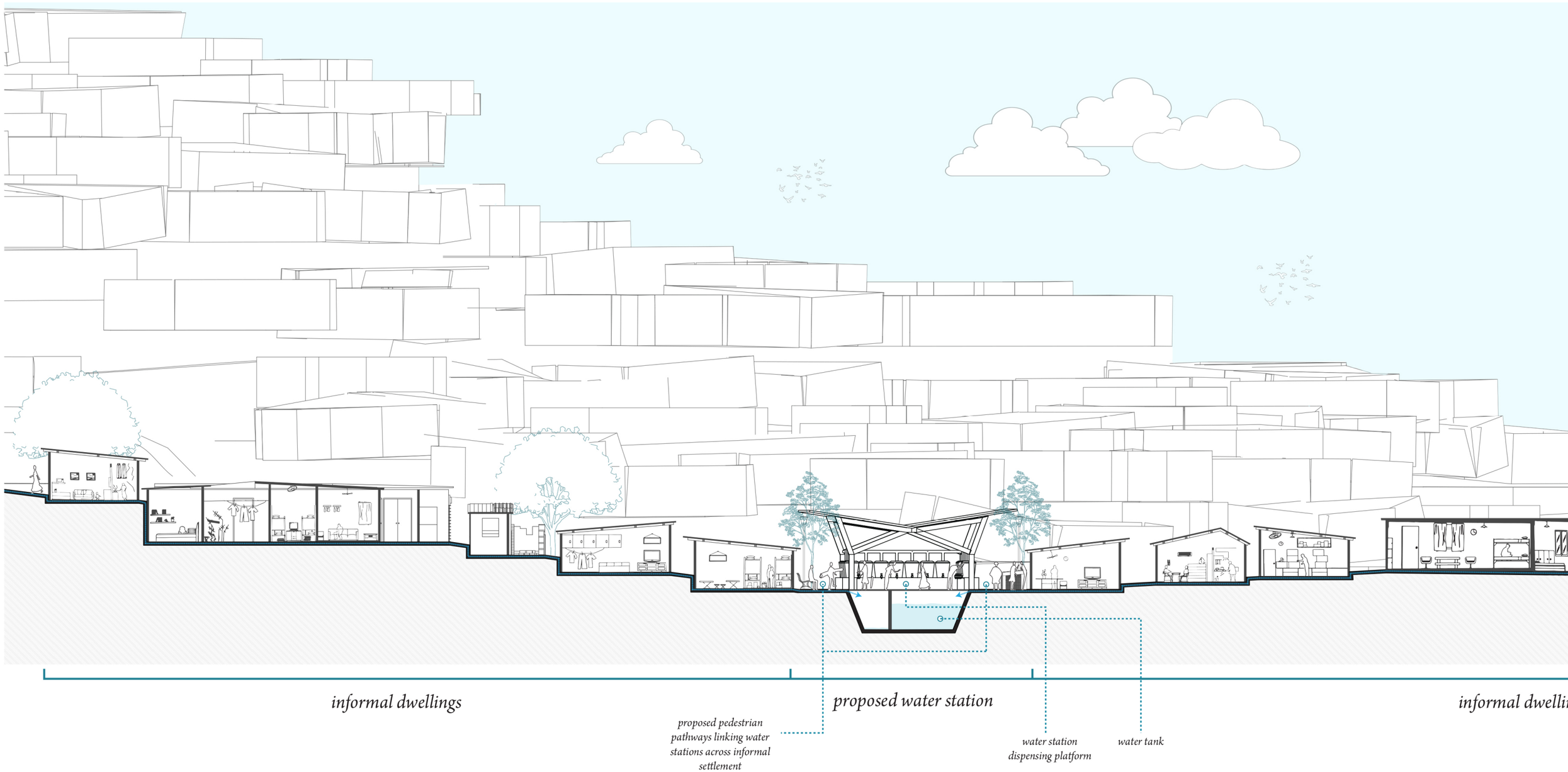


Figure 5.16: Exploded axonometric illustrating the systems comprised in the water station and the water filtration/distribution process



SITE 1 - KIMISAGARA WATER STATION - SECTION A-A

Figure 5.17: Kimisagara water station section A-A

ngs

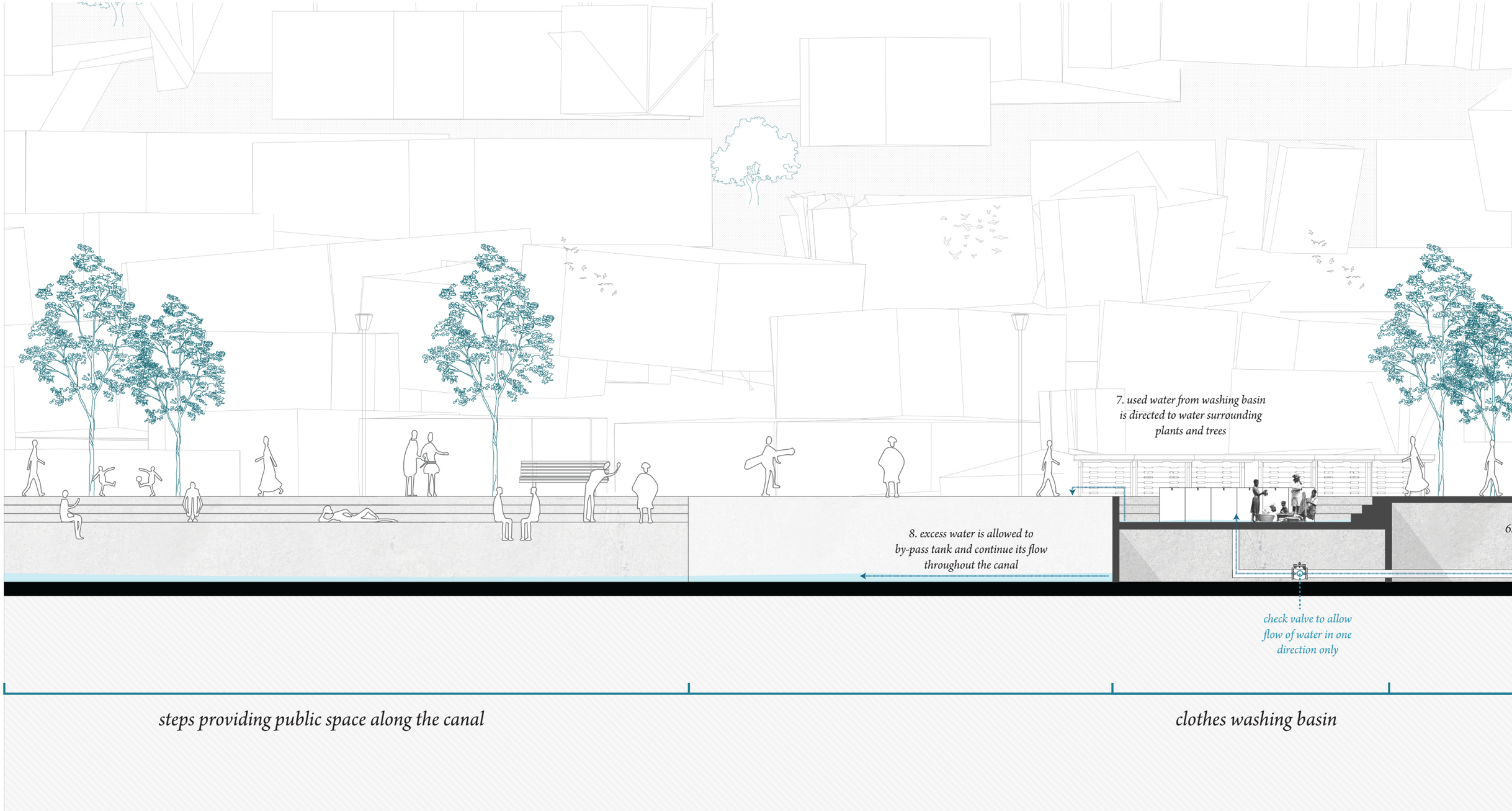
main road

buzzing centre of activity across Kimisagara

shopfront along main road

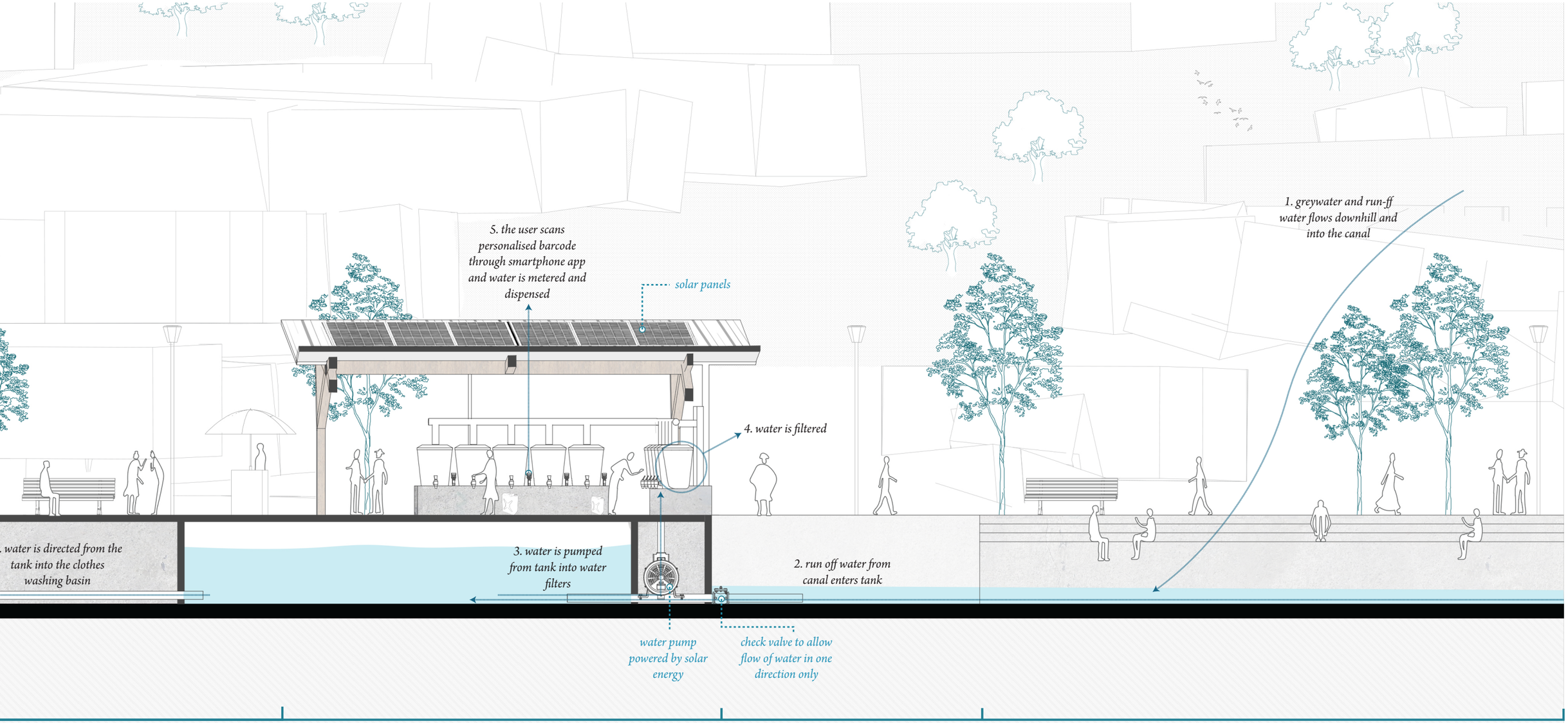
informal dwellings

0 m 5 m 10 m 20 m



SITE 1 - KIMISAGARA WATER STATION - SECTION B-B

Figure 5.18: Kimisagara water station section B-B


1. greywater and run-ff water flows downhill and into the canal
2. run off water from canal enters tank
3. water is pumped from tank into water filters
4. water is filtered
5. the user scans personalised barcode through smartphone app and water is metered and dispensed
. water is directed from the tank into the clothes washing basin
solar panels
water pump powered by solar energy
check valve to allow flow of water in one direction only
bridging platform
water dispensing station
steps providing public space along the canal
A
B
A
B
0 m
1 m
2 m
5 m
10 m

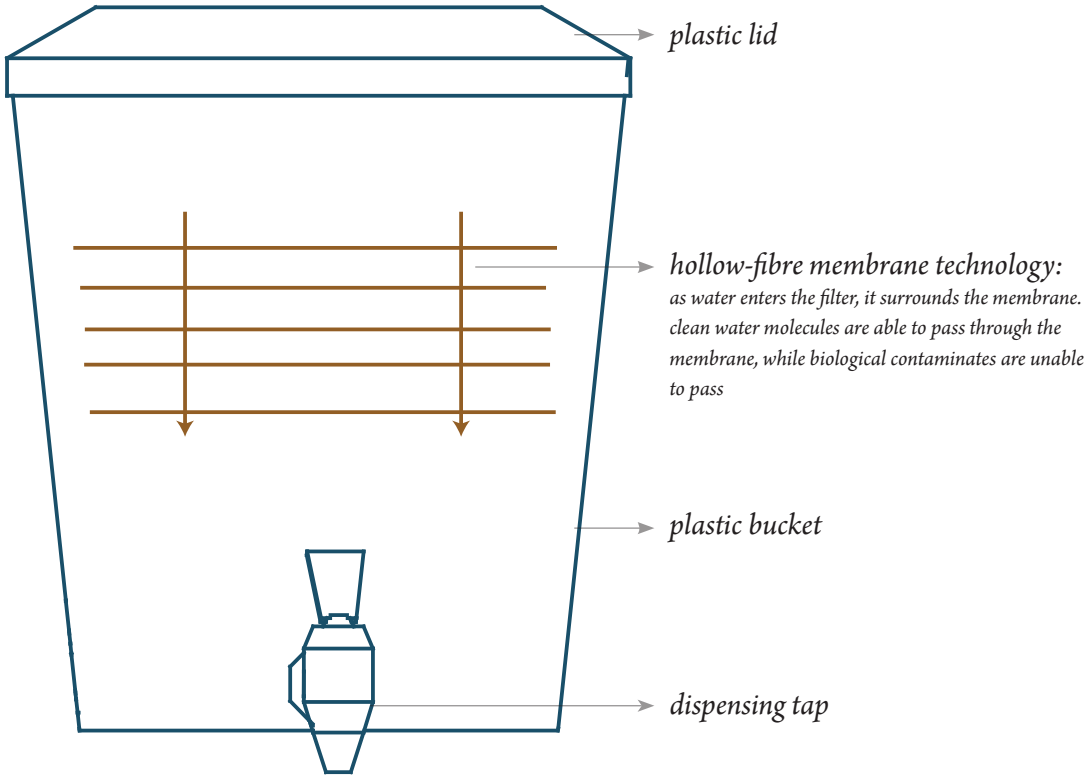


Figure 5.19: Diagram of the operation system of the Uzima Water Filters

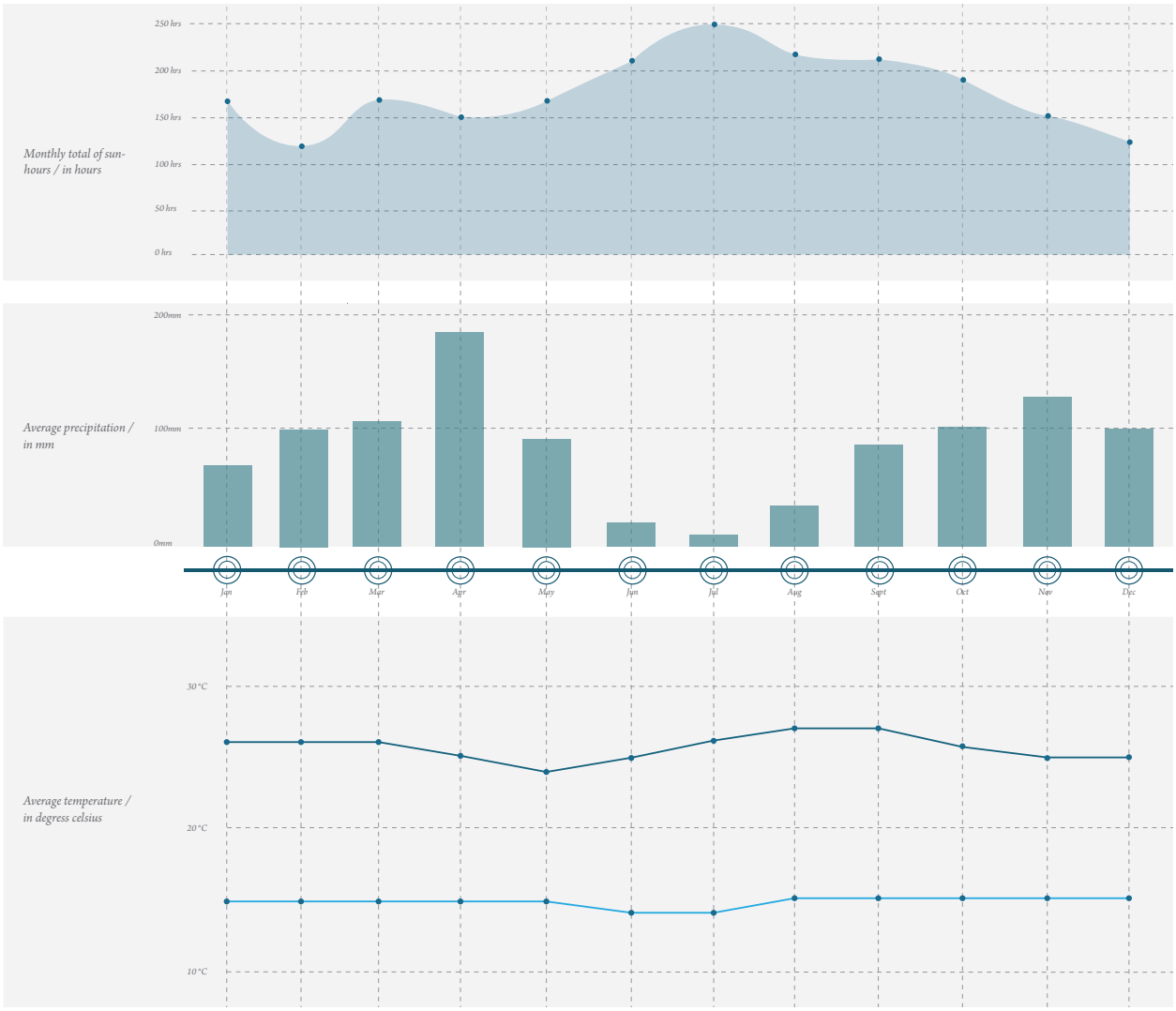
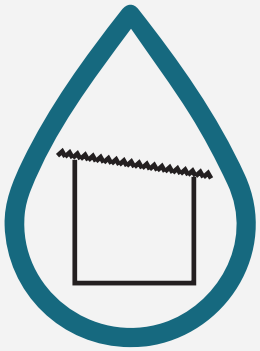


Figure 5.20: Climatic data for the city of Kigali, where the rainy seasons last mostly from February to June, and from September to December



average daily water consumption per low income household (with an average of 9 people per household)

183 L

average daily water consumption per informal settlement dweller in Kigali

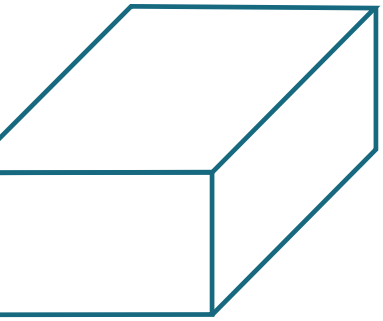
20.3 L

average daily water consumption per Canadian

329 L

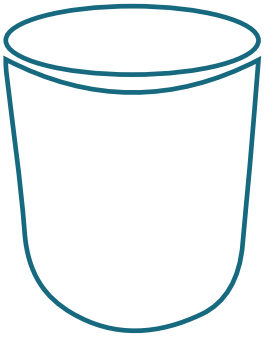
Sources: Assessment of Wastewater Management Practices in Kigali City, Rwanda, 2010
Statistics Canada

Figure 5.21: Calculations for water station efficiency



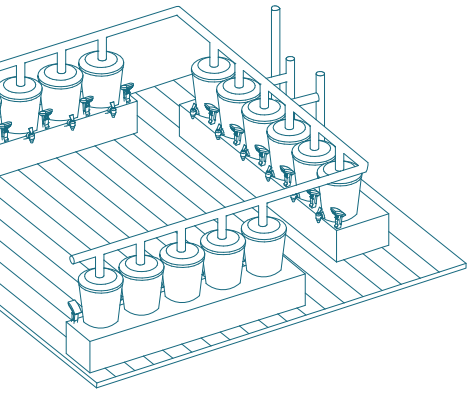
age water tank size

m³ = 80,000 L



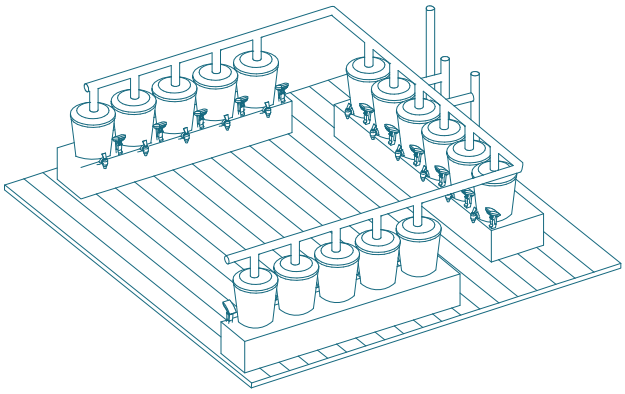
water filter rate of flow

40 L per hour



x. overall dispensing
rate for 16 filters

L per hour



assuming that the filter is used for approx. 12 hours a day,

max. overall dispensing
rate for 16 filters

7680 L per day

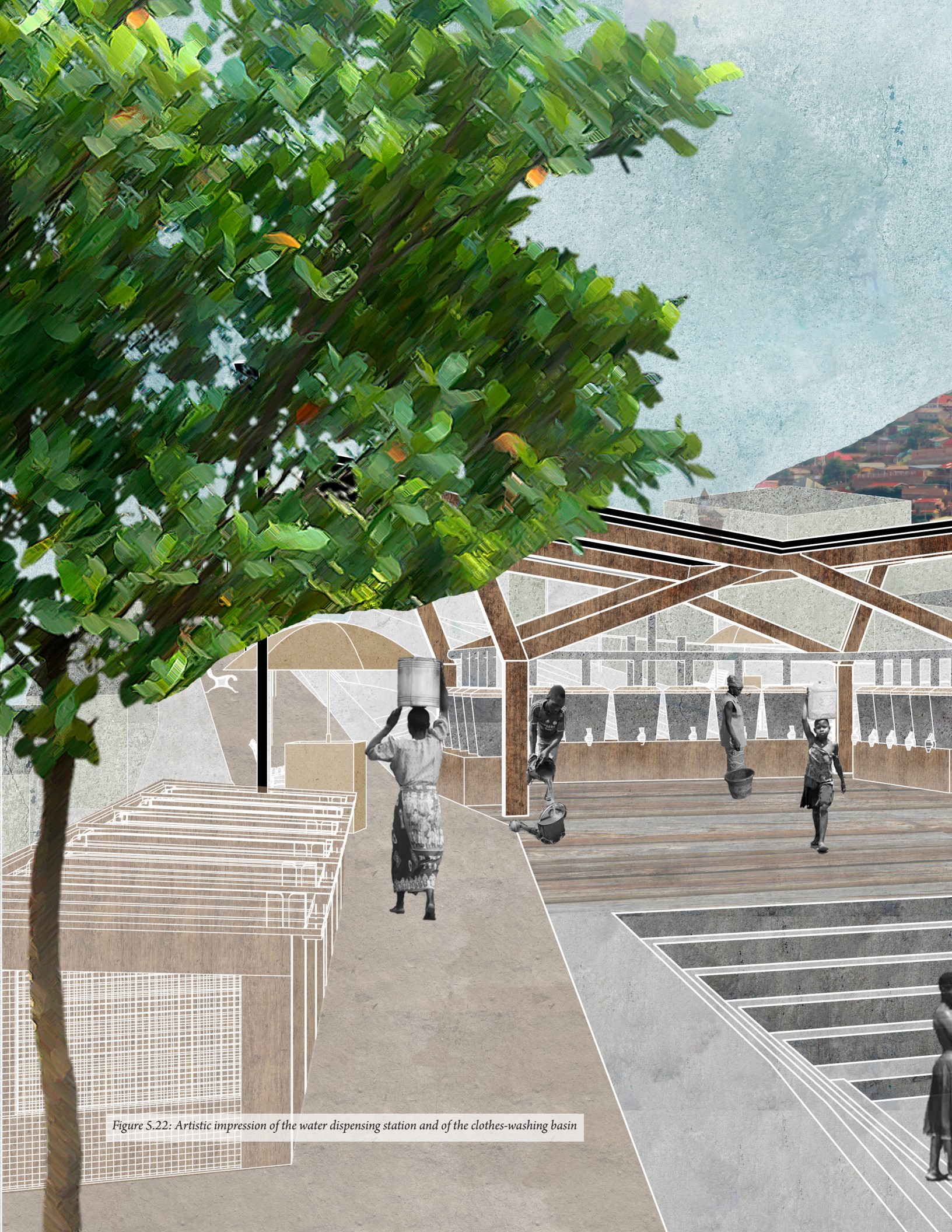


Figure 5.22: Artistic impression of the water dispensing station and of the clothes-washing basin

Form explorations

Through the design process, various iterations of shape and form were carried out to provide typologies that would be in line with the pitched metal sheet roof, which is very prominent across the informal settlements.

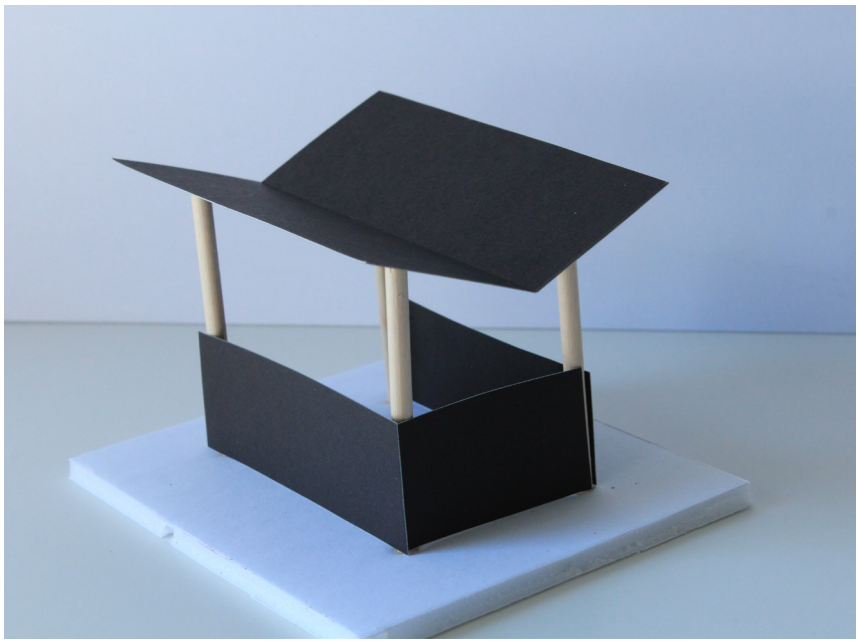
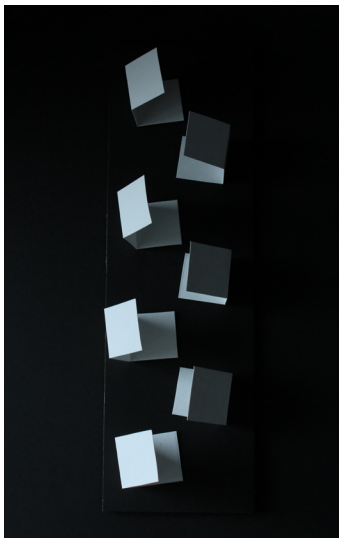
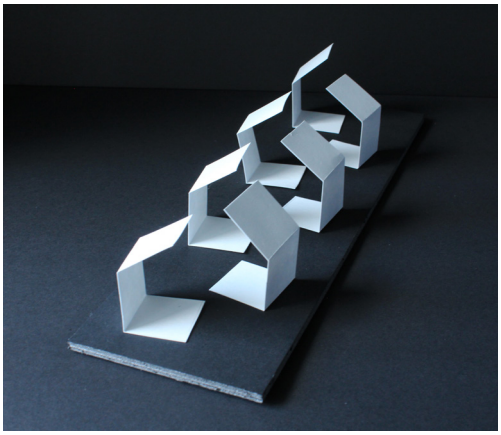
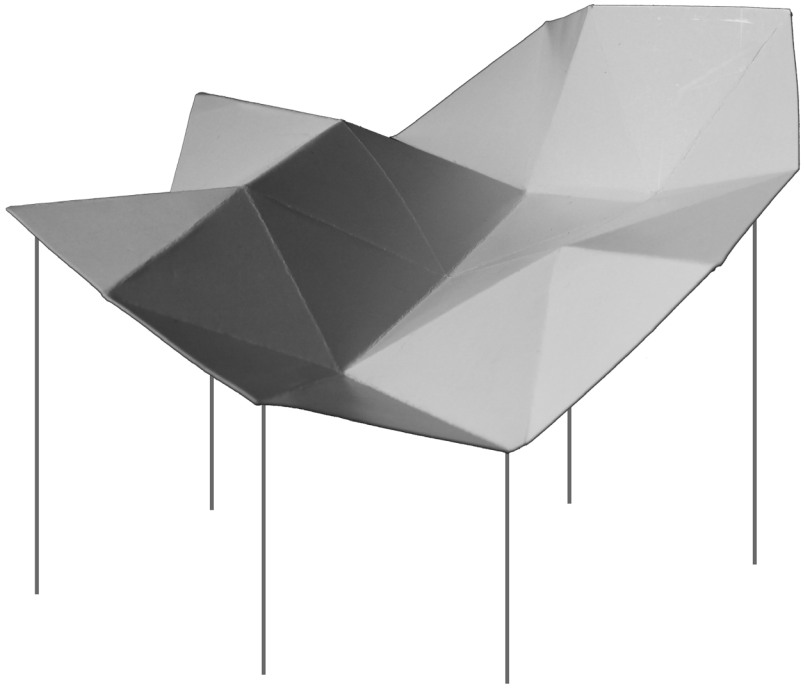


Figure 5.26: Model of water station, with inverted pitched roof

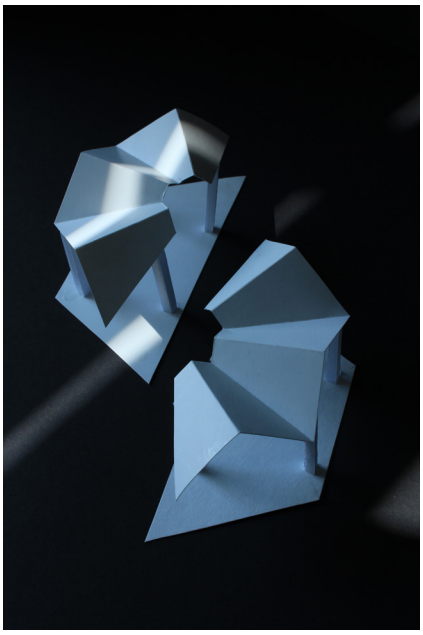


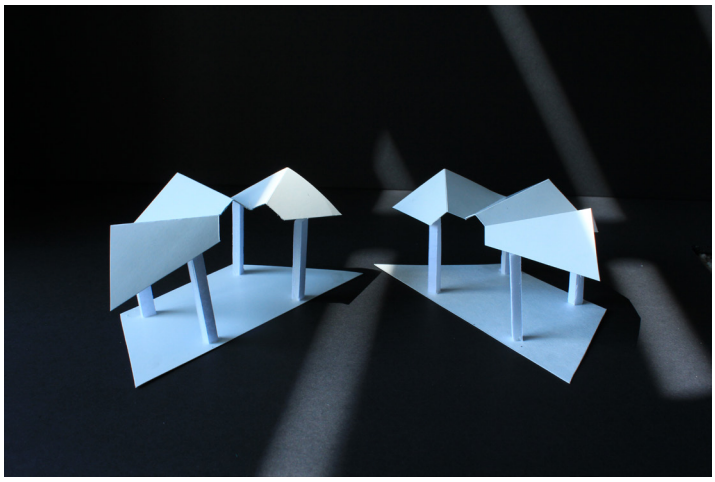


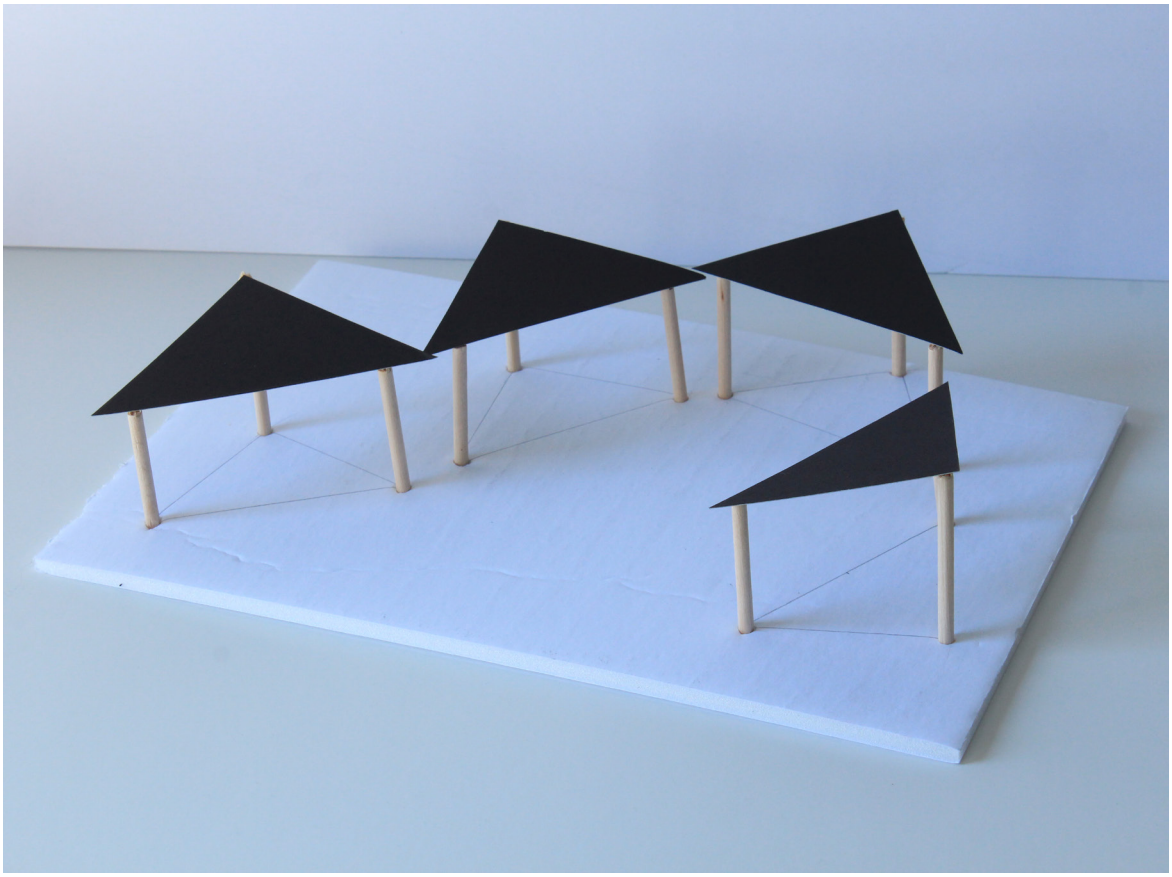
Figures 5.27 and 5.28: Set of canopies, as an exploration for an assembly of food stalls



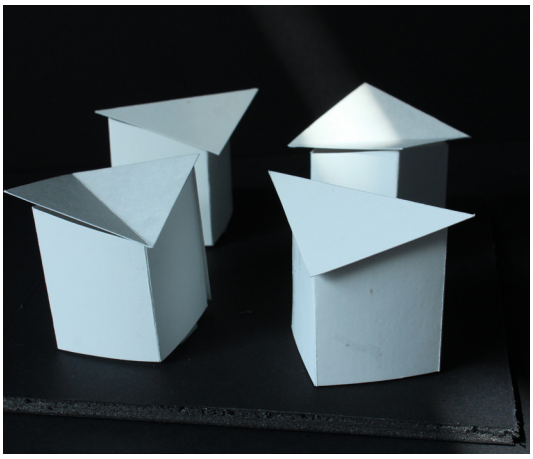
Figures 5.29 and 5.30: Explorations of market canopy

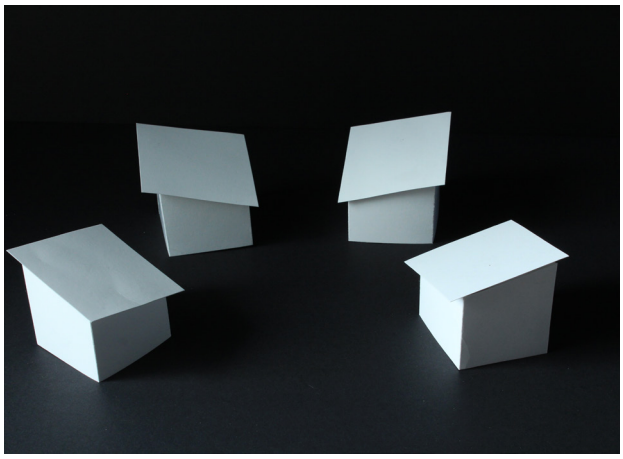


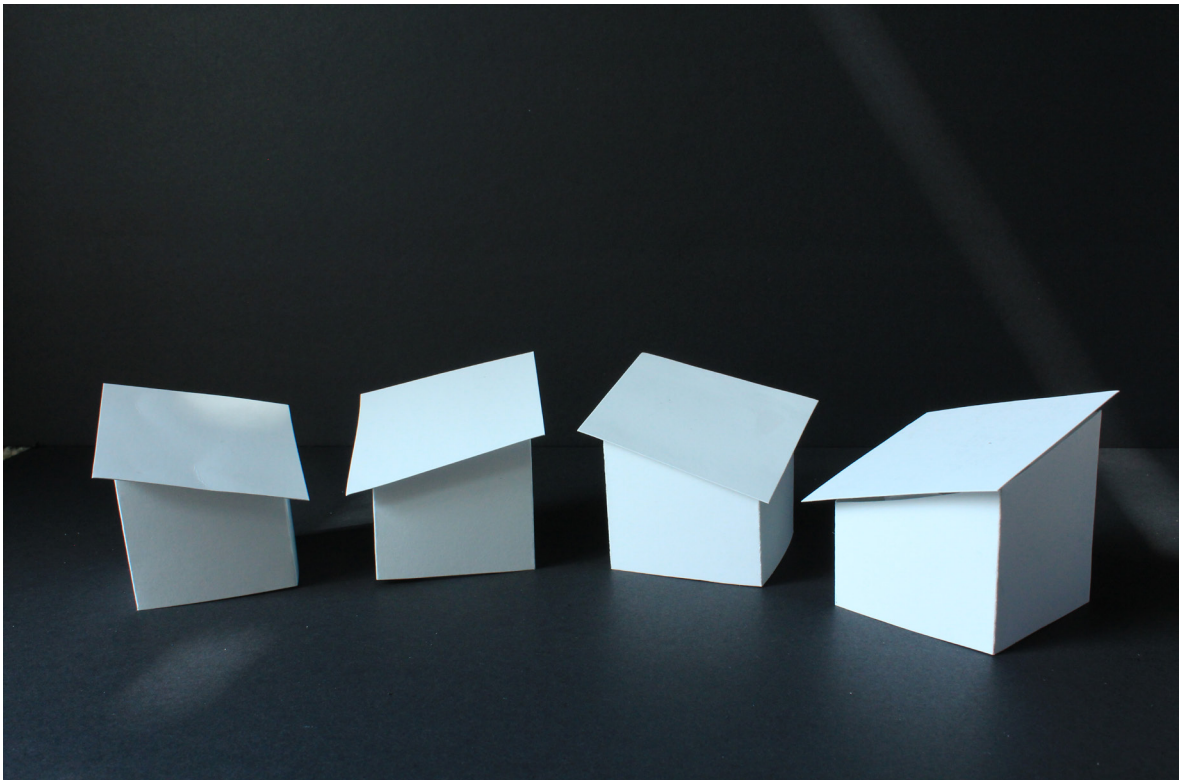




Figures 5.31, 5.32 and 5.33: Market canopy explorations







Figures 5.34, 5.35 and 5.36: Exploring configurations

5.4.2 Site 2 – Nyabugogo Node

The second site chosen for development is a transitional void located down the Kimisagara canal, preceding the junction where the canal meets the Nyabugogo wetland. Similar cemented conditions to site 1 are present as the canal bed, while a set of fragmented, makeshift activities occupy the site. The commercial and administrative zones are the main built areas while a sofa-repair areas and random parking lots surround them.

The main aim for this site was to re-define the idea of the market as a vehicle for public interaction. Every main informal settlement of Kigali hosts a market, but the spaces are unfortunately of poor quality, with bad lighting, lack of air, and are very hard to circulate. The proposal is built on the statements established by Simone and Pieterse, who infer that the structure of the 'make+shift' market is polyvalent: unloading, delivery, invoice, selling, buying, repairing, informing, allocating, juxtaposing are all tasks that are assumed by anyone operating in the market. [116] The proposed market hence fosters those roles by creating a space devoid of hierarchies, a space where the users define the procedures through which they think the space could be rendered the most productive.

The programming of the market is divided into 4 main parts: the fruits and vegetable market, the food stalls, the flea market and the craft market. To combine the need for water with the existing canal, the centre space of the market is defined by a plaza designed for washing purposes. This plaza will be used by 3 sets of people: the moto-taxi drivers, the flea market sellers – for washing of second hand clothes before re-sale - and the inhabitants of the surrounding informal settlement. Water stations from site one have been added to the canal to provide clean water.

To complement the main elements, a community centre has been proposed for meeting spaces and to house the management of the informal settlement. Opposite the community centre a vocational training facility has been proposed to train Kigali's expanding young population. Presenting options for vocational training is crucial to cater for the proportion of youth that are not academically-oriented. It also increases their employability since high-level education is a qualification that can become redundant on the Rwandan job market. Finally, a series of canopies have been introduced for the sofa-repair workers, to provide shelter during harsh weather conditions. The path across the canal enhances mobility to and from the Nyabugogo bus terminal. This ultimately creates an opportunity for the revitalisation of the bus terminal along as the wetland edge for a

116 Ibid.

Figure 5.23: Existing sofa repair spaces

Figure 5.24: Existing over-crowded Nyabugogo Transport Hub

Figure 5.25: Plan of existing conditions of site 2

LEGEND

1. Canal with polluted water

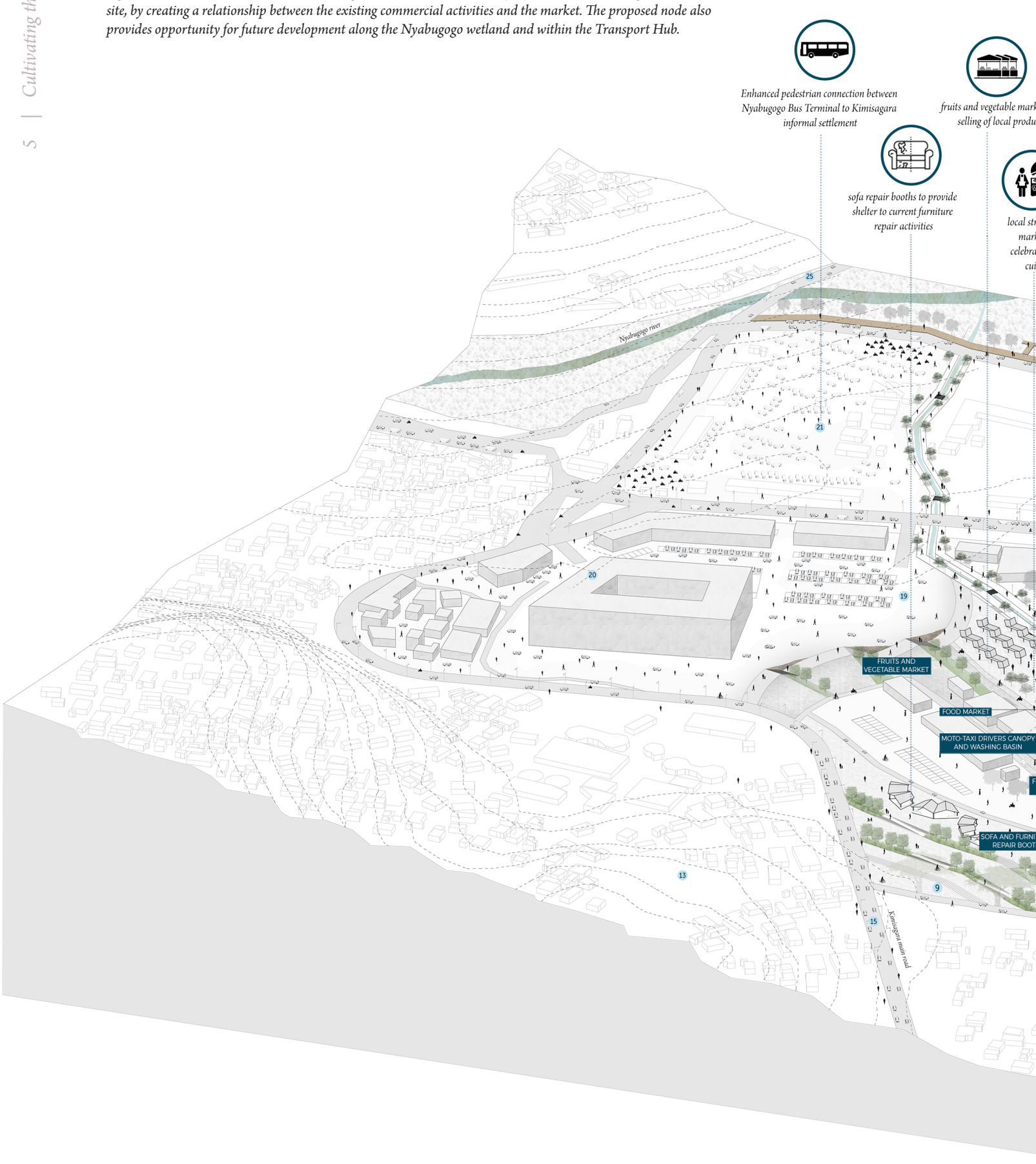
2. Industrial area to be relocated

3. Commercial area

4. Banks and offices

5. Open-air repair yard for sofas and other furniture

Figure 5.37: Axonometric of site 2, illustrating the connection between the proposal and the existing elements on the site, by creating a relationship between the existing commercial activities and the market. The proposed node also provides opportunity for future development along the Nyabugogo wetland and within the Transport Hub.



flea market for vendors to sell the second hand washed clothes, contextually adapted to the economic demands of the informal settlement

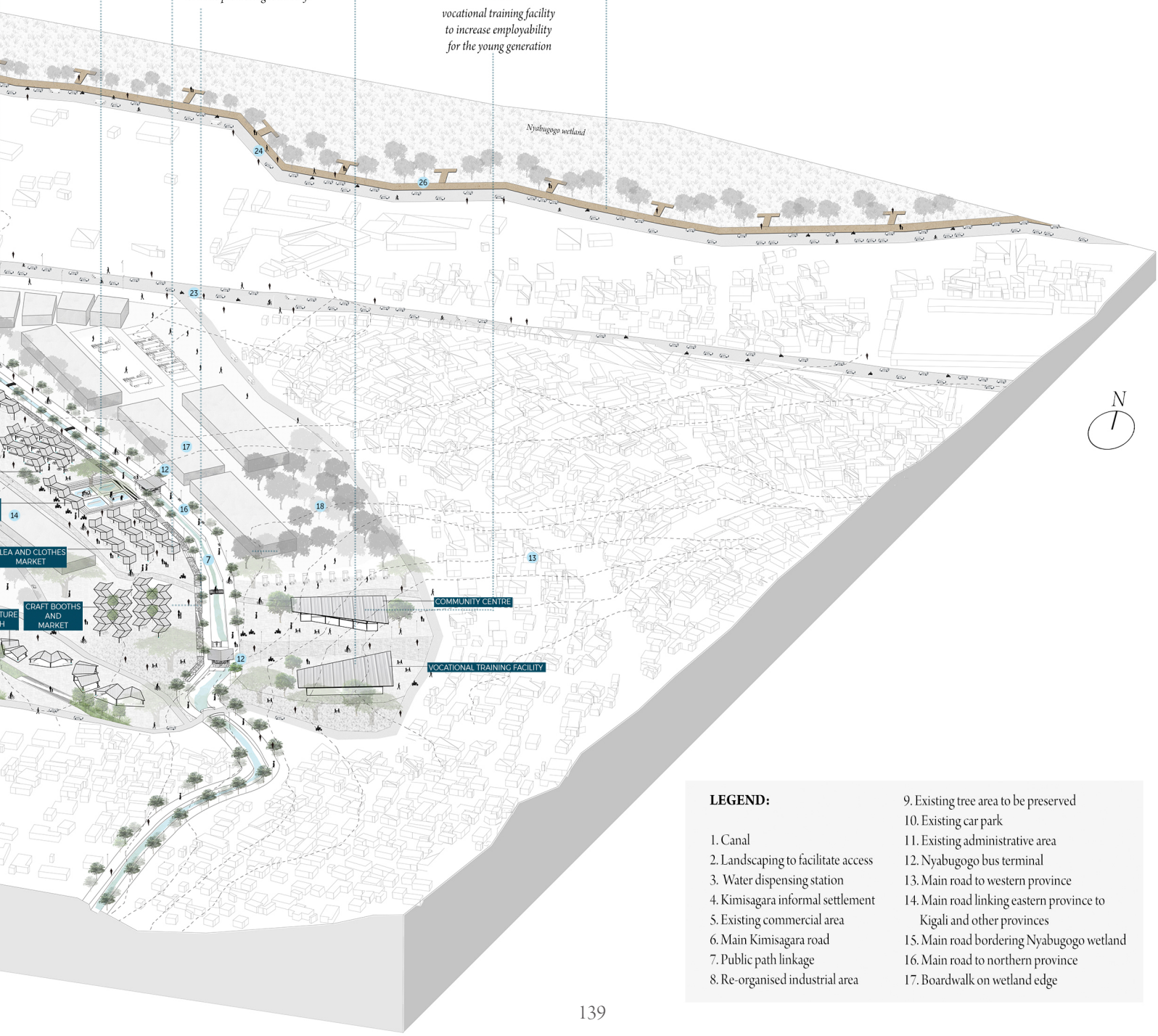
washing basin and plaza, where washing becomes a communal activity, and the plaza strengthens social interaction

booths for crafters and tailors to make and sell their art, towards promoting local craft

community centre as a place for formal gathering as well as an administrative centre for Kimisagara

vocational training facility to increase employability for the young generation

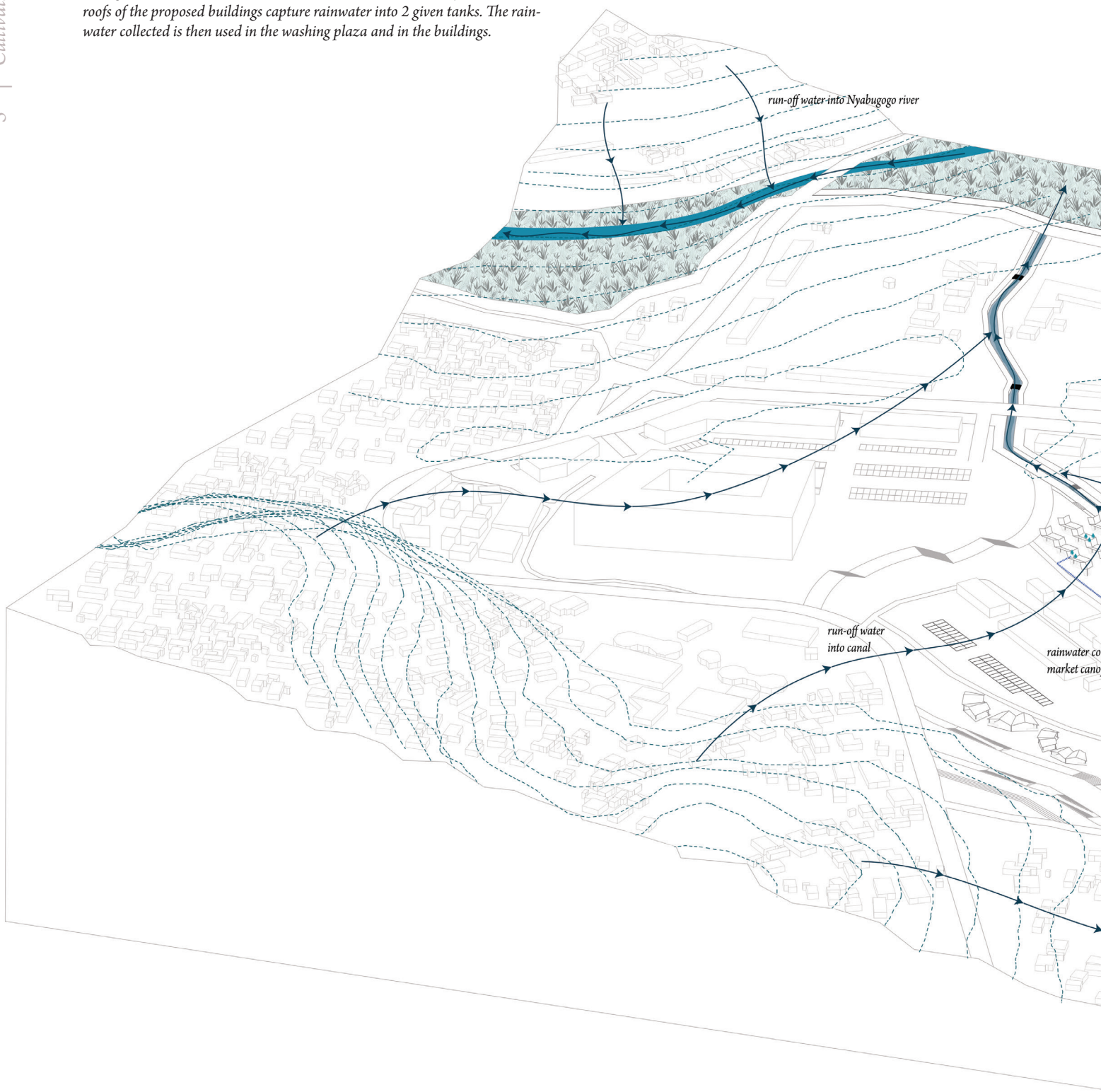
boardwalk to enhance access between the city and the wetland edge

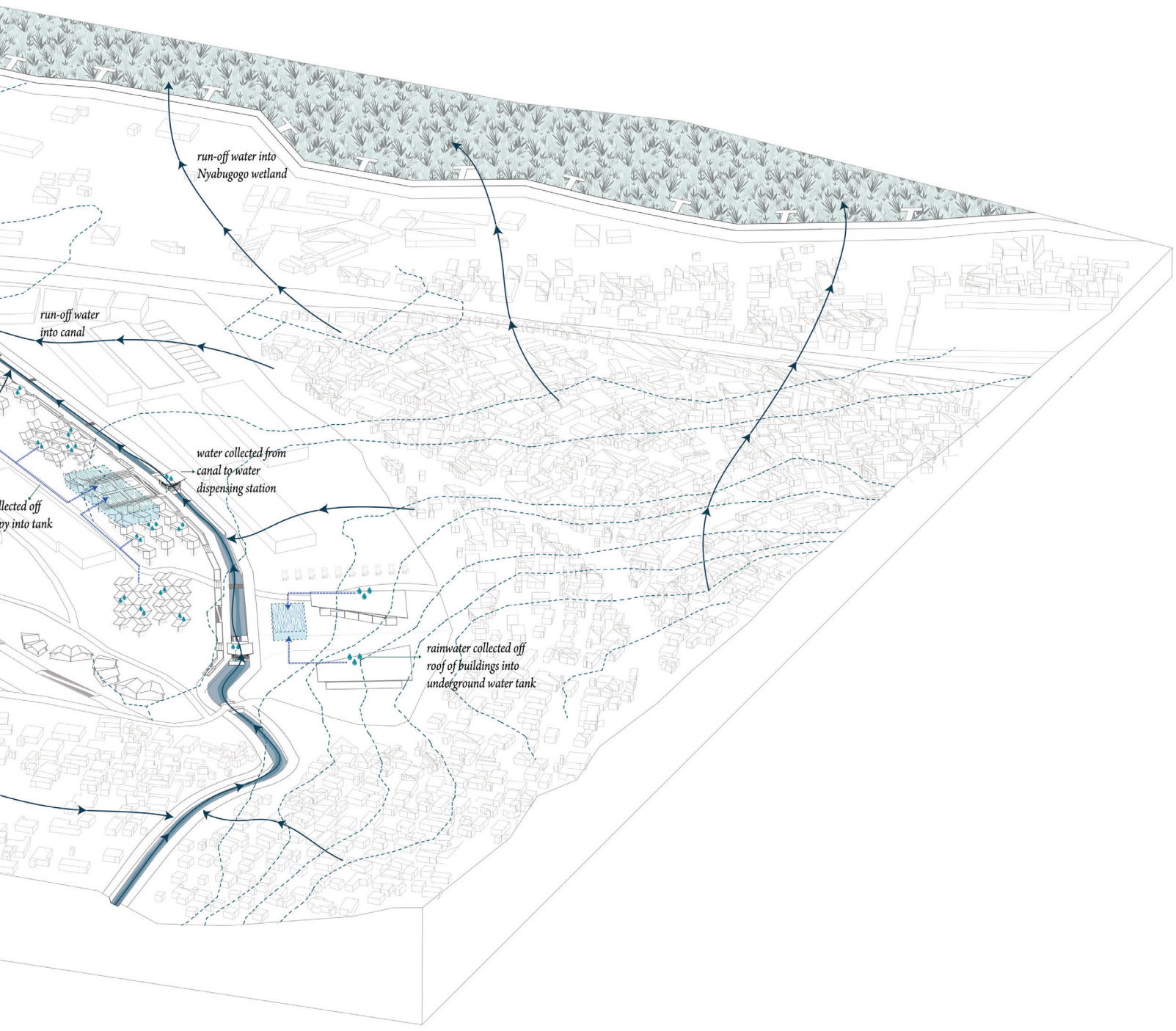


LEGEND:

1. Canal
2. Landscaping to facilitate access
3. Water dispensing station
4. Kimisagara informal settlement
5. Existing commercial area
6. Main Kimisagara road
7. Public path linkage
8. Re-organised industrial area
9. Existing tree area to be preserved
10. Existing car park
11. Existing administrative area
12. Nyabugogo bus terminal
13. Main road to western province
14. Main road linking eastern province to Kigali and other provinces
15. Main road bordering Nyabugogo wetland
16. Main road to northern province
17. Boardwalk on wetland edge

Figure 5.38: This diagram illustrates the water systems across the sites. Just like on the previous site, the canal captures the run-off water and is dispensed through the water stations. On the other hand, the market canopies, and the roofs of the proposed buildings capture rainwater into 2 given tanks. The rainwater collected is then used in the washing plaza and in the buildings.




run-off water into
Nyabugogo wetland
run-off water
into canal
water collected from
canal to water
dispensing station
rainwater collected off
roof of buildings into
underground water tank

better transition between the city and the wetland.

Since most urban dwellers living in informal settlements are marked by over-crowding, it is essential that the public realm (the street, key social and mobility nodes) is optimised as a social space, an economic artery and a primary cultural domain.[117] Gathering spaces are at the heart of the design to enhance community interaction. The craft market is composed of crafting booths with seating spaces, creating a chance for members of the public to interact with the crafters. Craft is valued both by the locals, and by the growing number of tourists that visit Kigali. These booths hence provide an opportunity for social exchange, regardless of one's degree of belonging to a certain segment of society.

Simone's and Pieterse's idea of collective form over definitive form[118] has been embodied through the sofa-repair pods. This consists of finding the forms through which people and things can appear to each other in ways that articulate a common operational space.[119] A rhizomatic approach has also been adopted while designing the pods, creating the opportunity for multiplicities and alternations as the function of the spaces evolve over time. The assembly of the different markets, crafting and sofa-repair booths also create a vector of economic transformation, a catalyst towards larger future urban development.

117 Simone, AbdouMaliq, and Pieterse, Edgar. 2017. New Urban Worlds. Cambridge, UK: Polity Press.

118 Ibid.

119 Ibid.

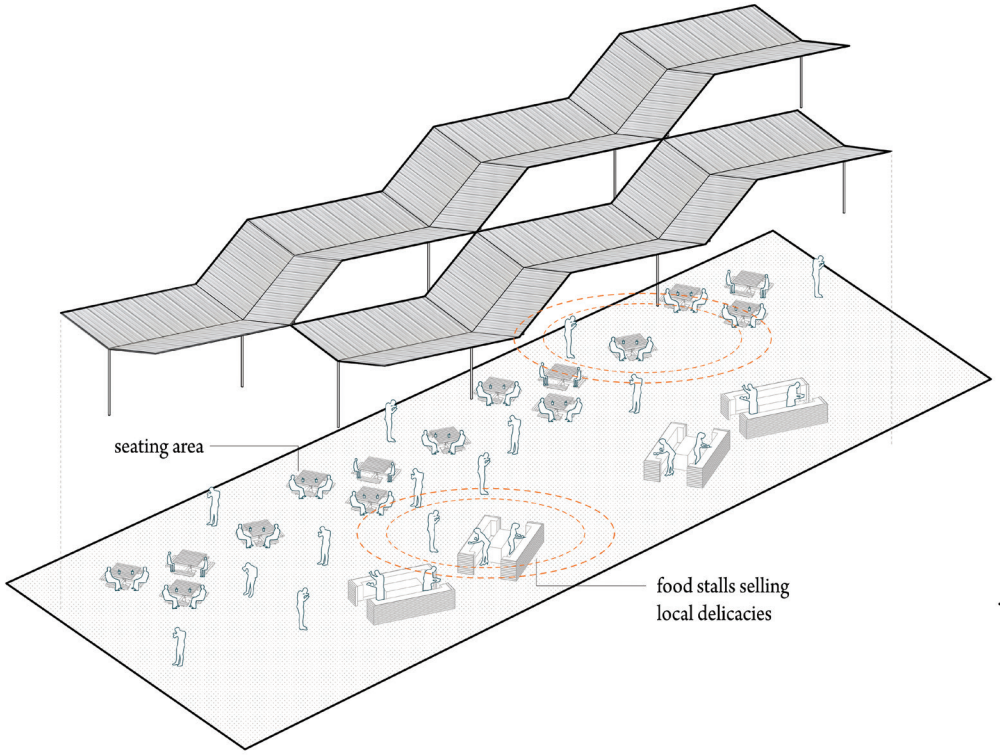


Figure 5.39: Food market axonometric

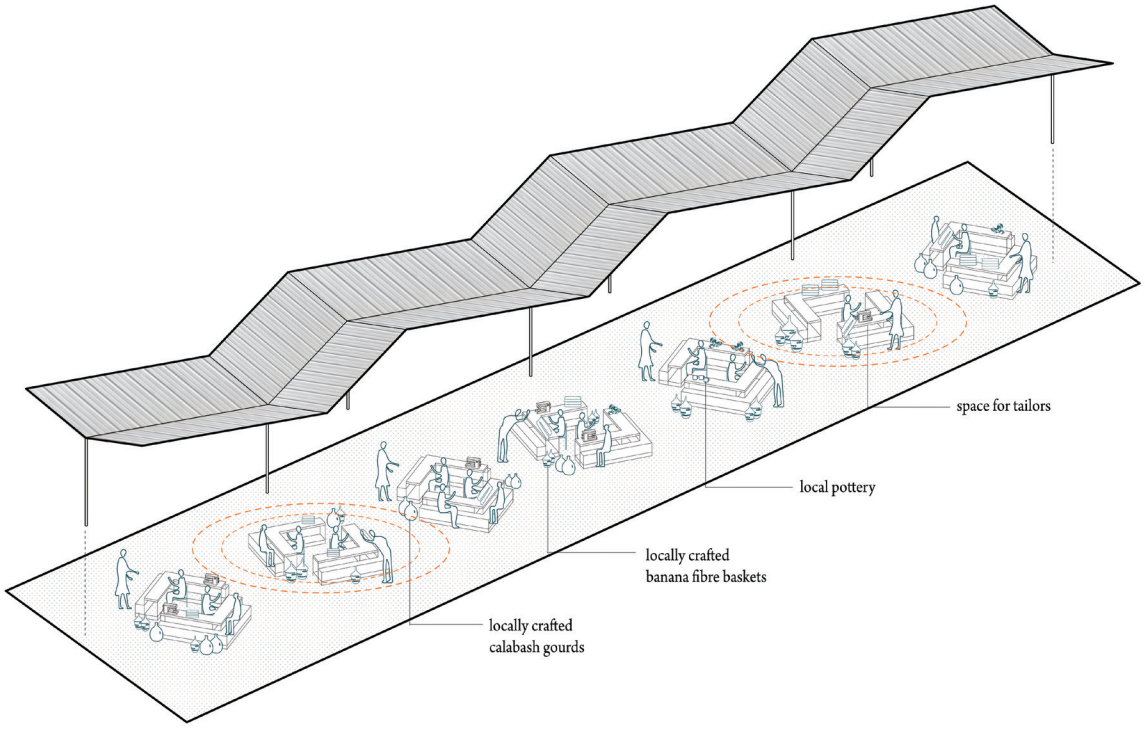


Figure 5.40: Craft market axonomtric. The urban furniture provides opportunity for members of the public to interact with the crafters

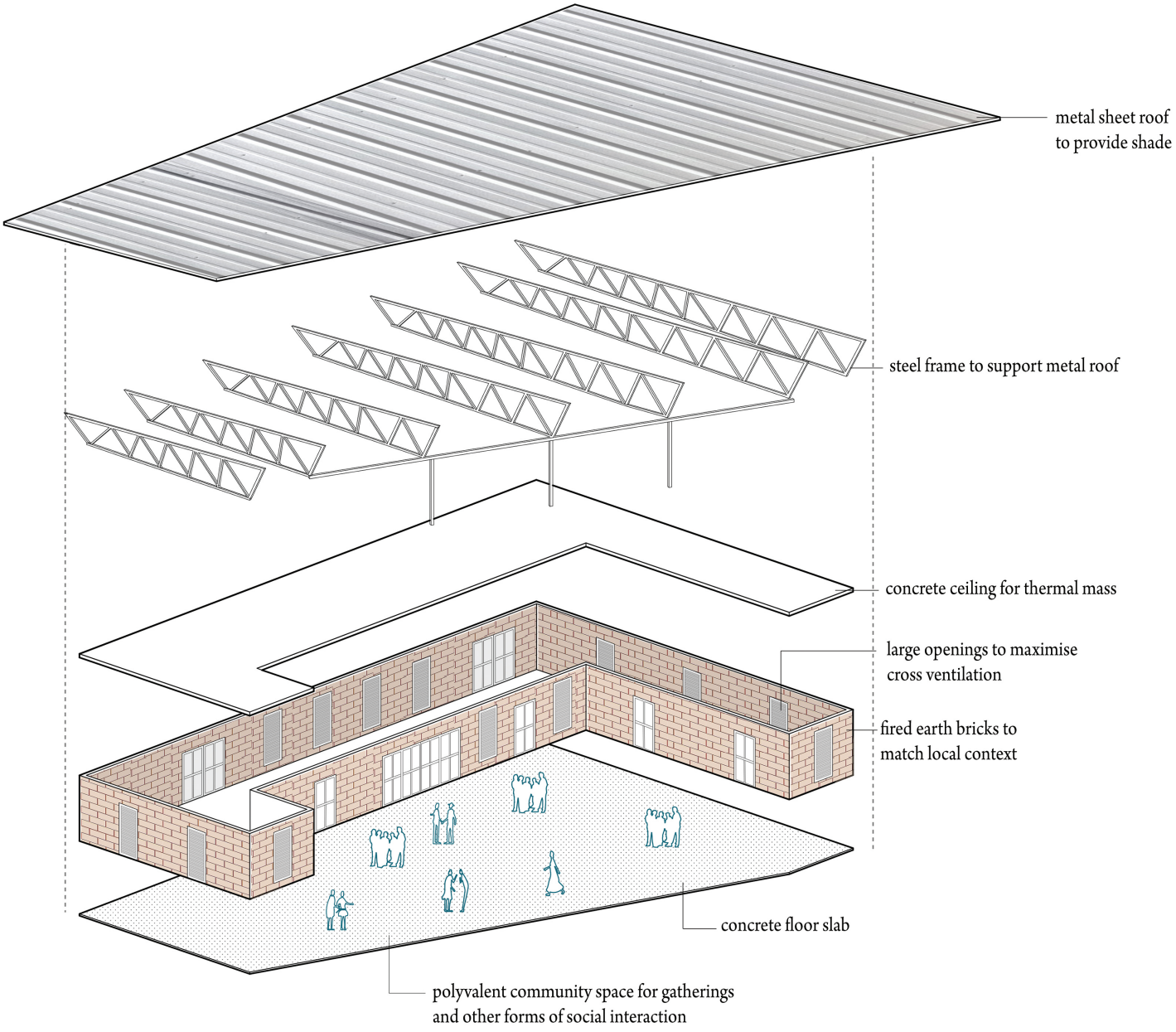


Figure 5.41: Community centre and vocational training centre exploded axonometric.

fostering the main local economic driver, with

66.46% *of Rwandans working in agriculture*

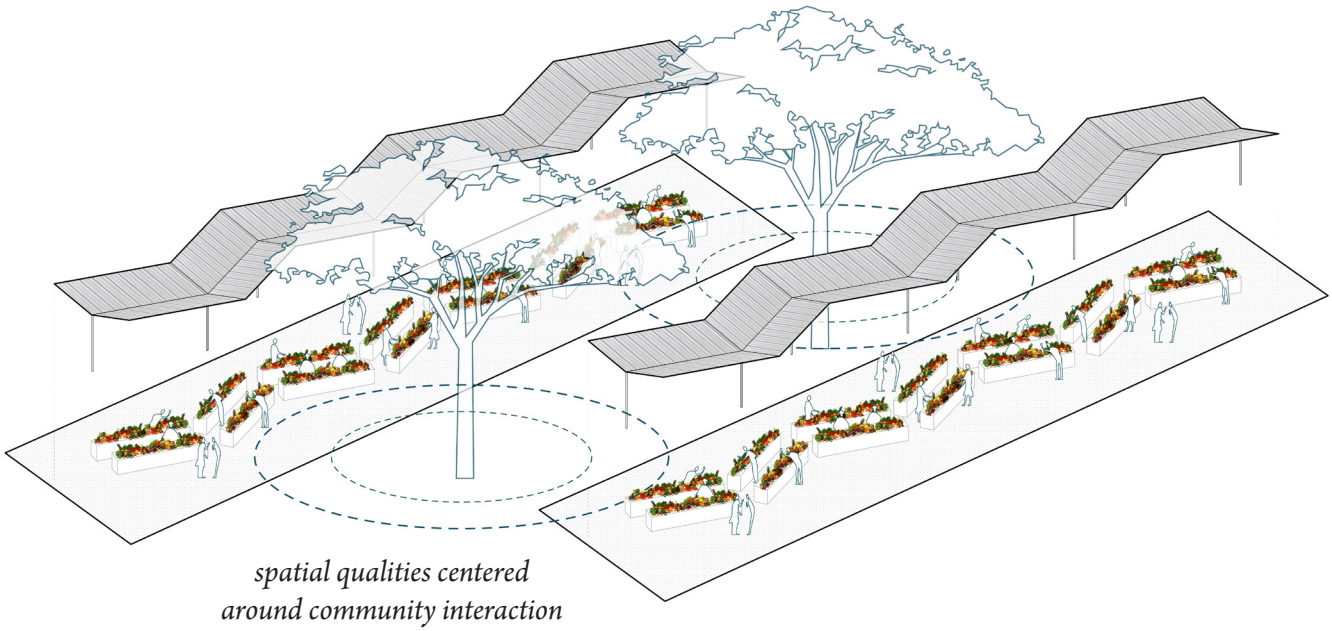


Figure 5.42: Fruits and vegetables market axonometric

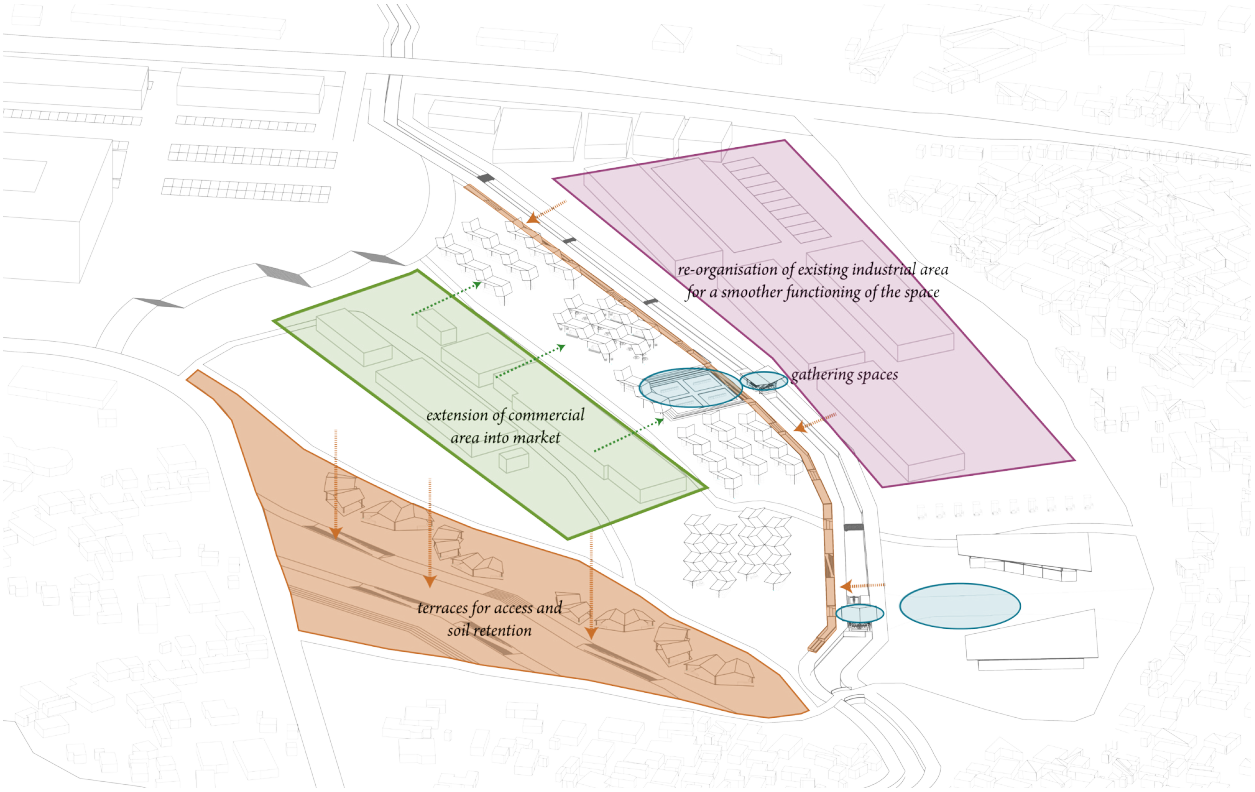
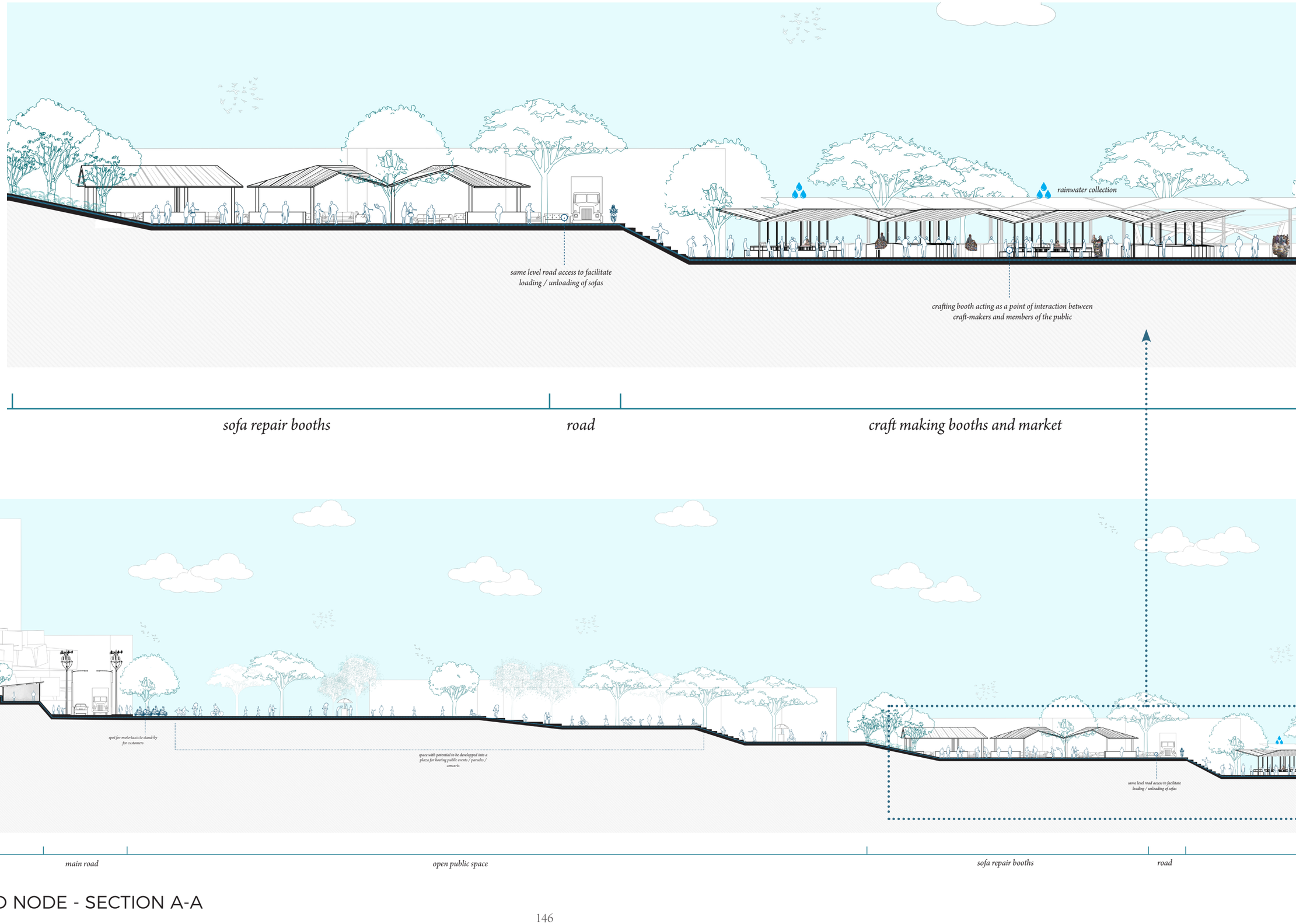
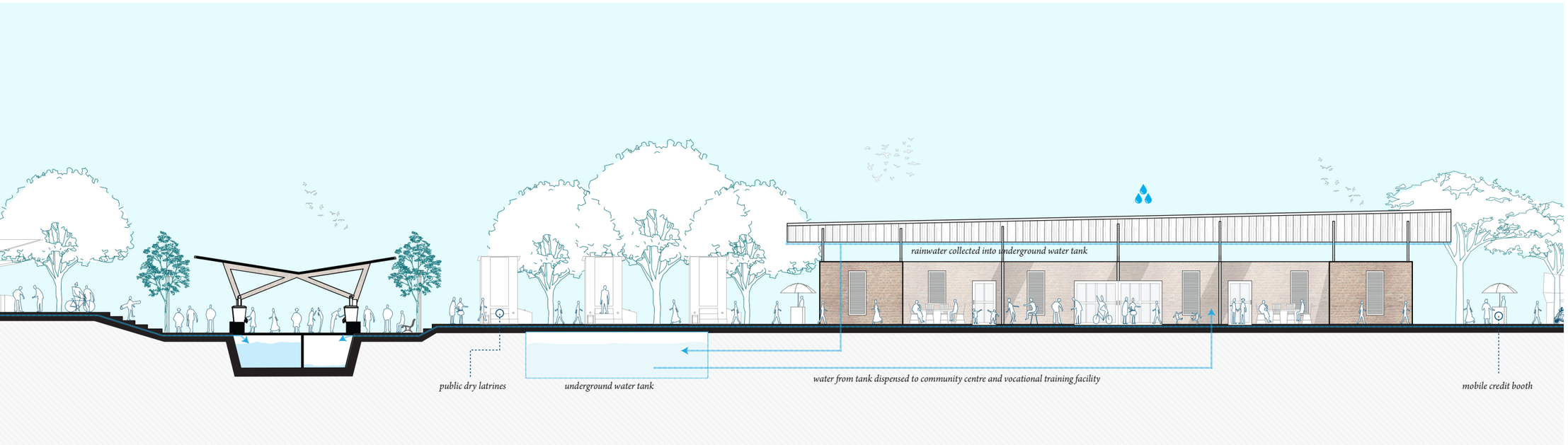


Figure 5.43: Site response diagram



SITE 2 - NYABUGOGO NODE - SECTION A-A



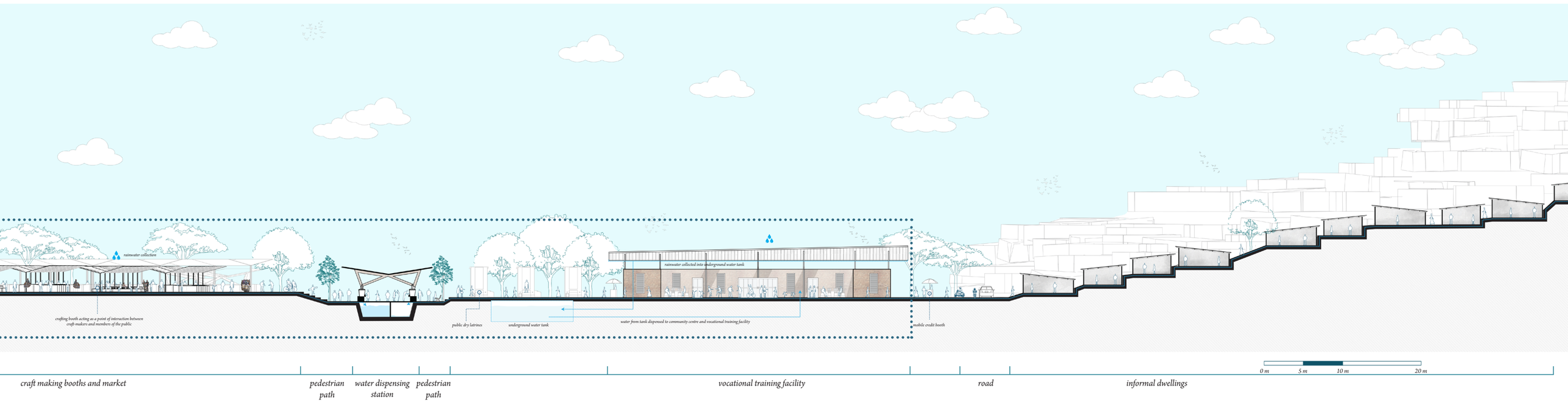
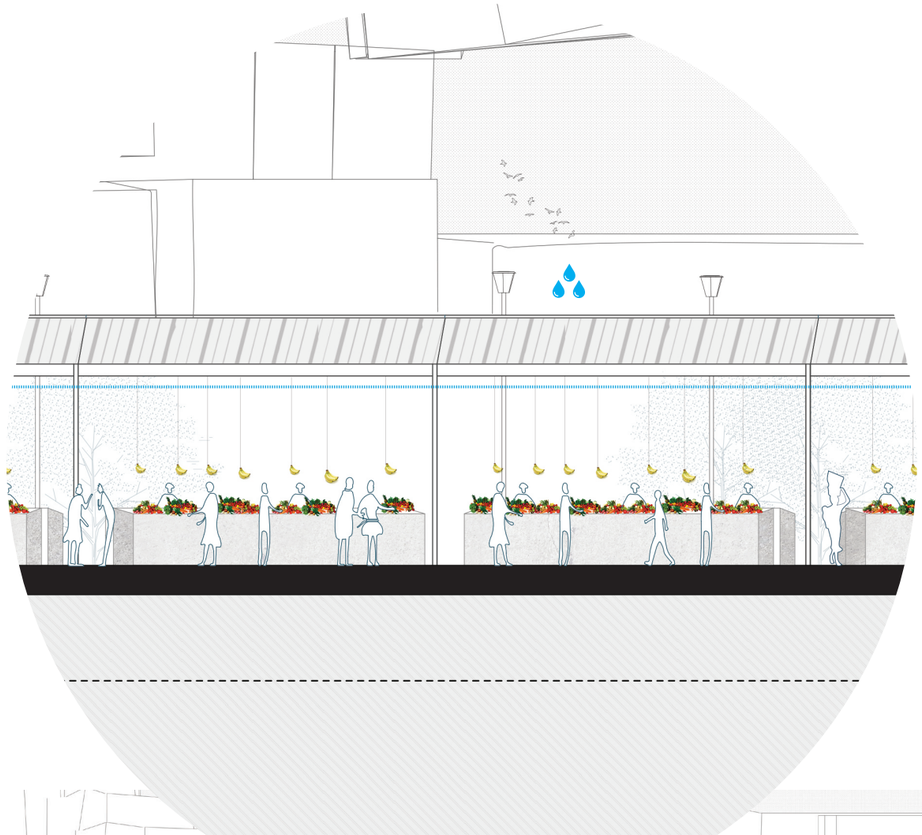
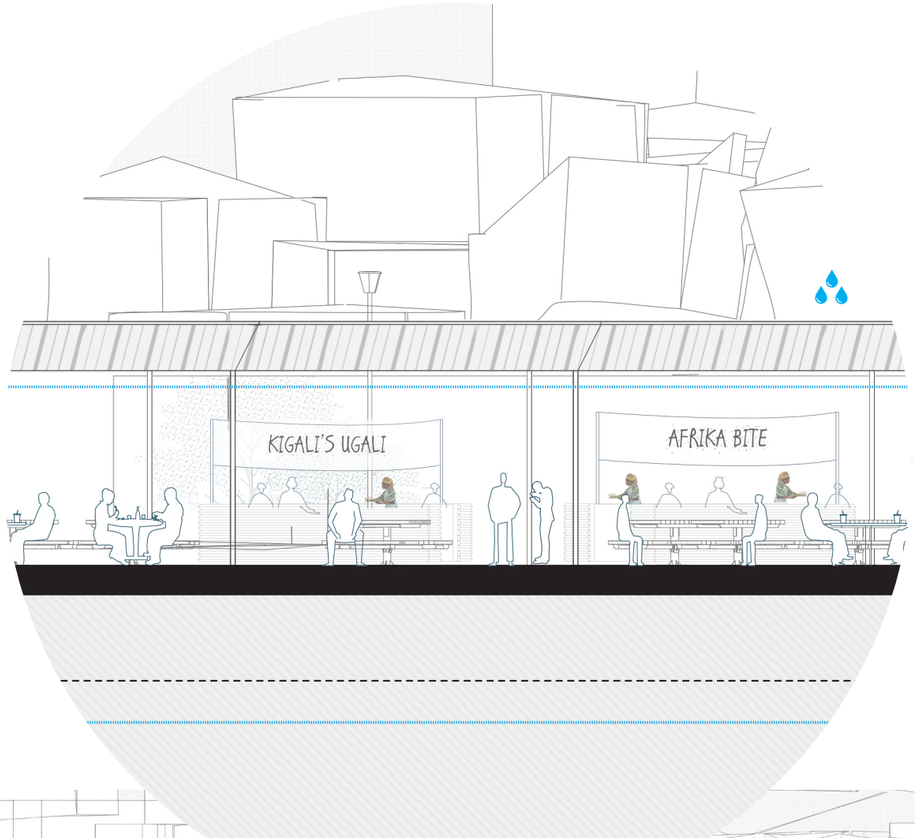
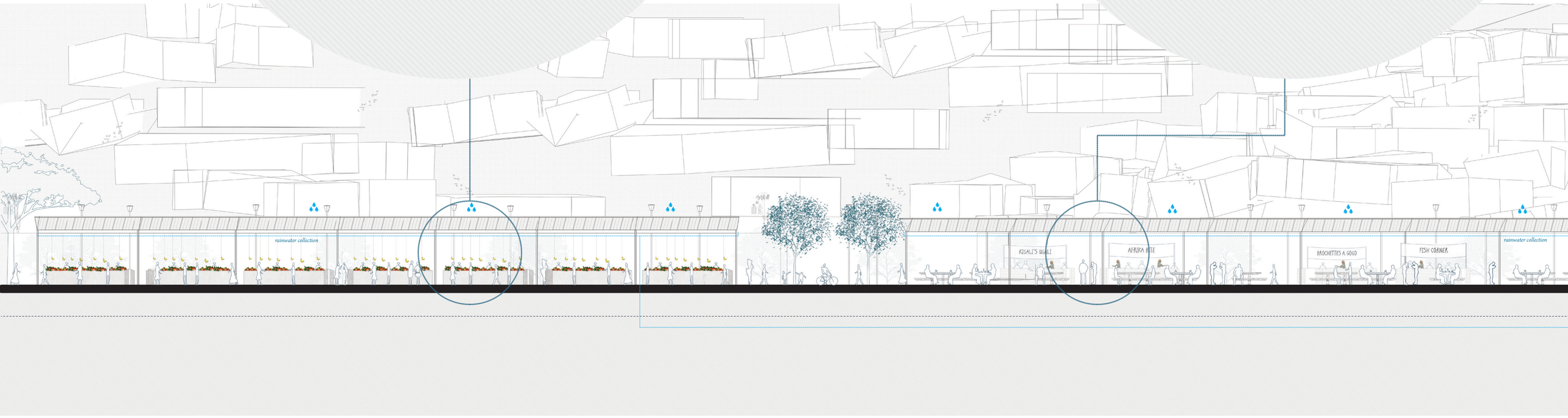


Figure S.44: Nyabugogo Node Section A-A







fruits and vegetable market

street food market

SITE 2 NYABUGOGO NODE SECTION B-B

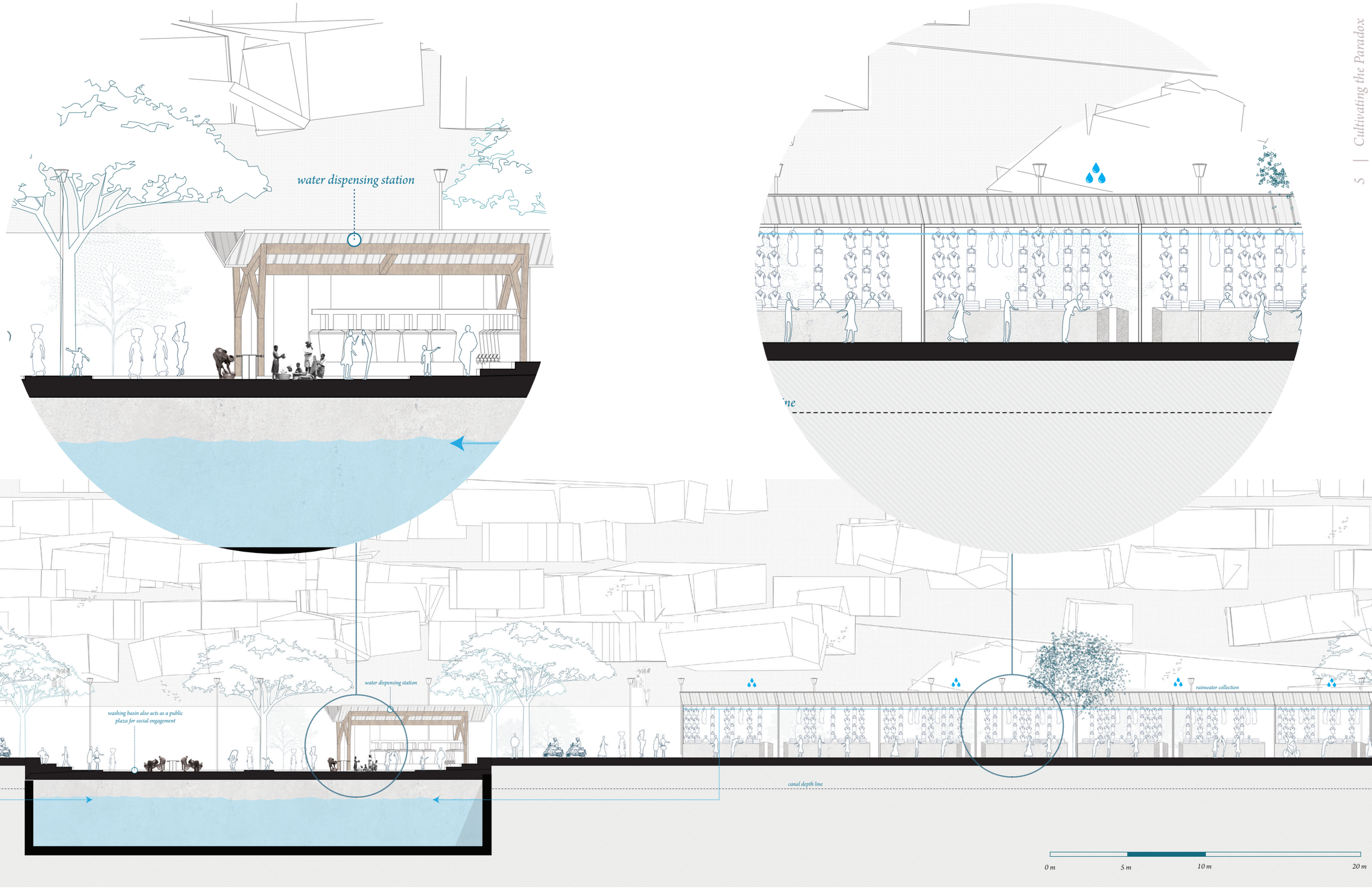


Figure 5.45: Nyabugogo Node Section B-B

Figure S.46: Artistic Impression of the water station (left), public path (middle), and washing plaza (right), with the flea market in the background

5.4.3 Site 3 – Agatare Agricultural Node

The final site elaborated through this thesis is located in an agricultural setting bordered by informal settlements, with the only public space available being the wetland, and the Biryogo sector centre. A sports centre is available north of the site, but it is gated and reserved for the higher classes. The type of agriculture practiced is mostly used for commercial crops and in a small part for subsistence crops. In a similar manner to sites 1 and 2, the wetland collects run-off water from the informal settlement. During the rainy season, this causes flooding problems and the crops are drowned in excess water. The main issues to be tackled within site 3 are the low quality of water draining down the wetland and polluting the crops, as well as the poor quality of water supplied to the inhabitants of the informal settlement.

The main approach adopted in this case is one based off Phytotechnology, which Kirkwood and Kennen[120] define as "the use of vegetation to remediate, contain or prevent contaminants in soils, sediment and groundwater, and/or add nutrients, porosity or organic matter." [121] The proposed design consists of seven nodes across the site. A constructed wetland belt wraps around the edges of the agricultural portions to provide a primary filtration, before the water is directed into water retentions ponds across the seven nodes. Each node is equipped with a solar powered pump and a water dispensing station – equipped with the Uzima Water Filters - to provide potable water captured in the retention ponds to the inhabitants of the informal settlement.

The wetland belt is made up of a surface-flow constructed wetland where water is directed through planted marshes and engineered soil media at varying depths to remove contaminants.[122] The primary mechanism at work in this process is Rhizofiltration, where the degradation of contaminants occurs around the roots of the plants by means of microbial activity which is enhanced by the presence of plant roots. No plant harvesting is required through this process.[123]

A system of boardwalks has also been designed to enhance access to, and within the wetland. The boardwalks are destined to be used by pedestrians, bikers and moto-taxis, towards transforming the wetland into platform for connectivity. As shown on diagram

120 Kennen, Kate, and Niall Kirkwood. 2015. Phyto - Principles and resources for site remediation and landscape design. New York: Routledge.

121 Ibid.

122 Kennen, Kate, and Niall Kirkwood. 2015. Phyto - Principles and resources for site remediation and landscape design. New York: Routledge.

123 Ibid.

Figure 5.47: Agatare Informal Settlement

Figure 5.48: Agriculture practices in the Agatare wetland

5.54 (Page 164), the nodes are located within 400m of each other to maximise walkability. The nodes are also comprised of composting gardens, which help manage organic waste, reduce the use of fertilisers in the fields, and also serve as a community building exercise. Care has also been taken to maximise the user-interaction with the wetland with seating pods and platforms. The designed proposed through site 3 demonstrates how rooted activities centered around informal settlements can act as a platform for creating infrastructure that fosters sustainable communities.

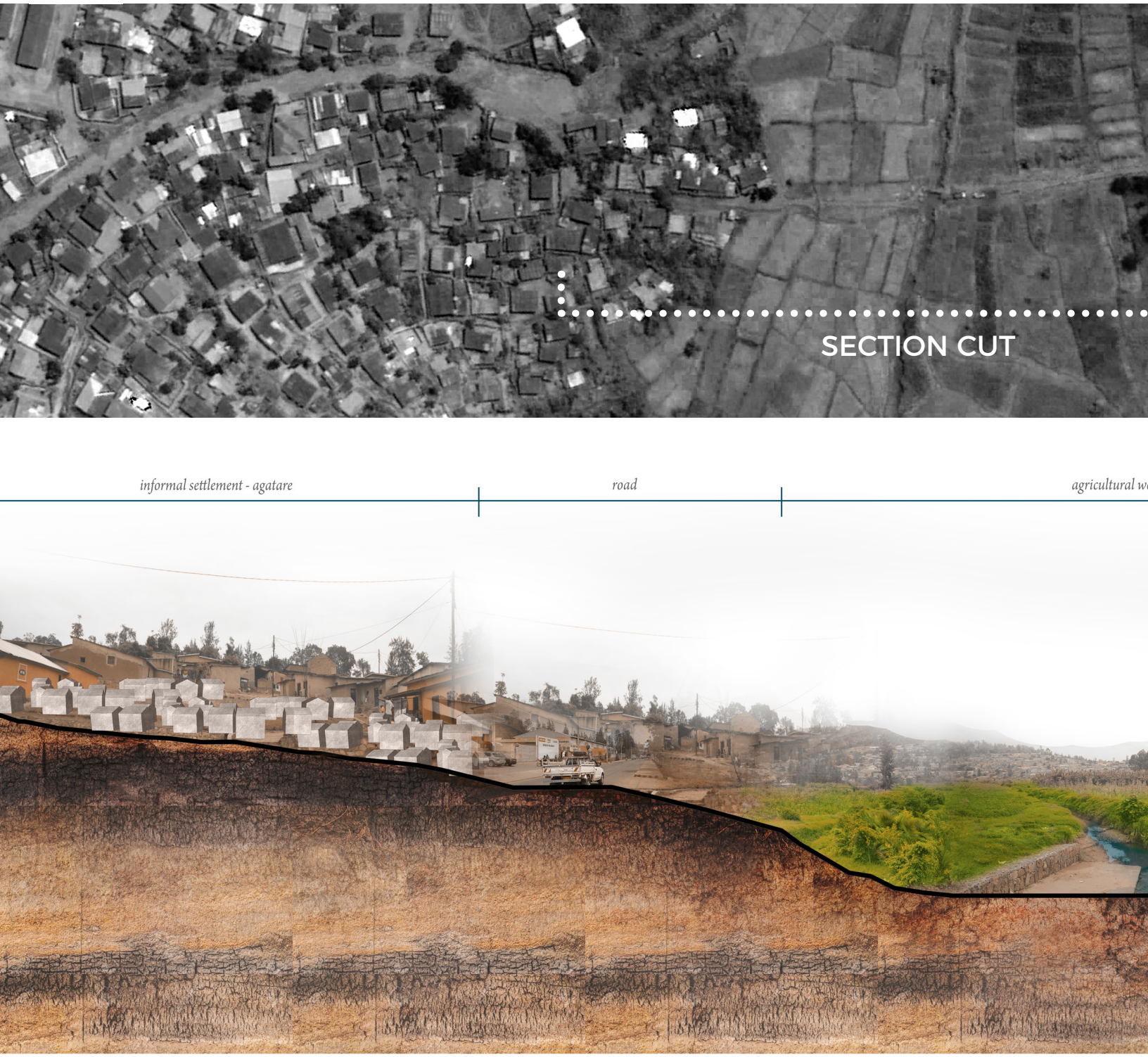
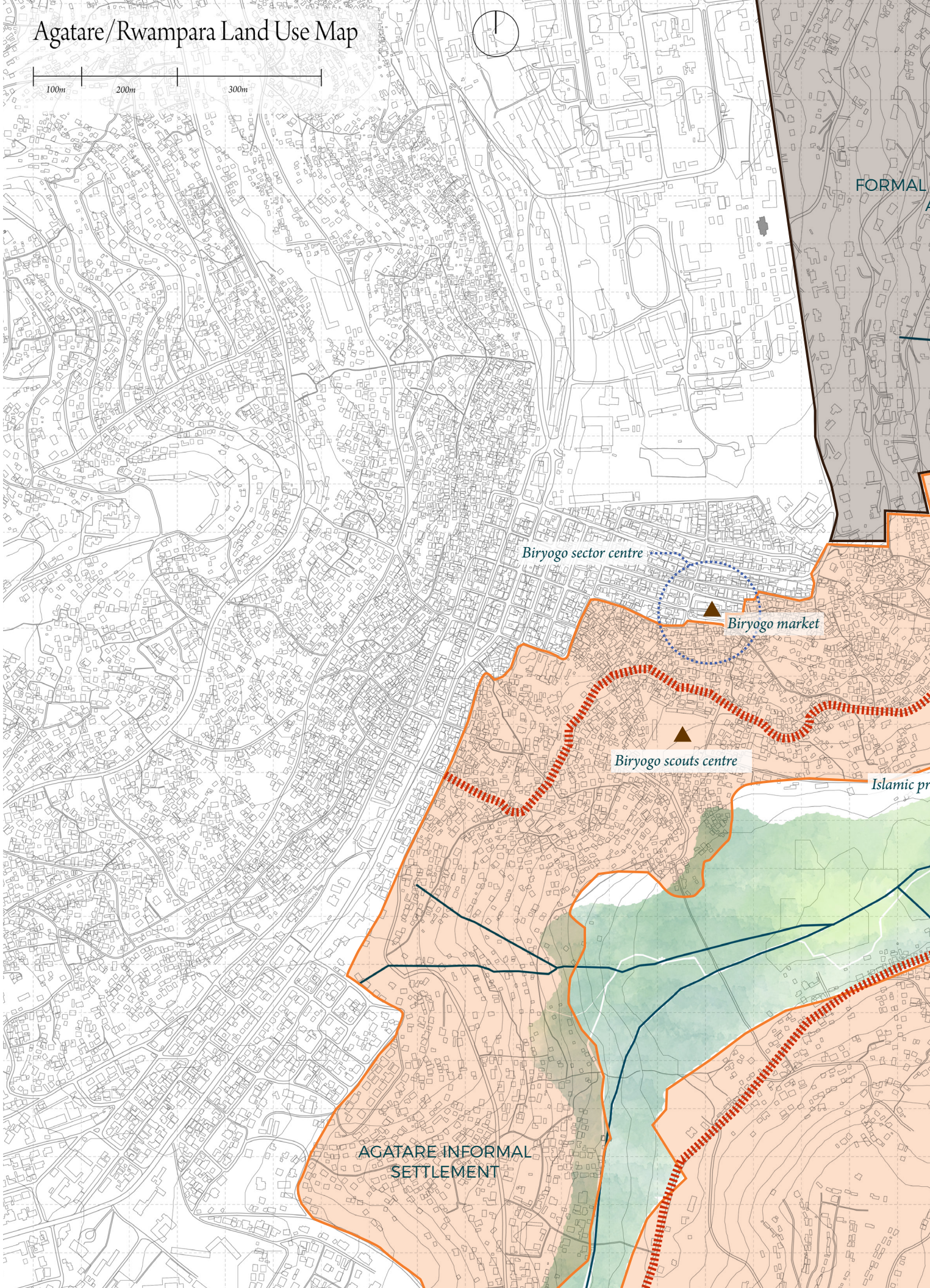


Figure 5.49: Section of Agatare wetland and informal settlement - existing conditions

etland - rwampara

informal settlement - gikondo


Agatare/Rwampara Land Use Map
100m
200m
300m
FORMAL
Biryogo sector centre
Biryogo market
Biryogo scouts centre
Islamic pr
AGATARE INFORMAL
SETTLEMENT

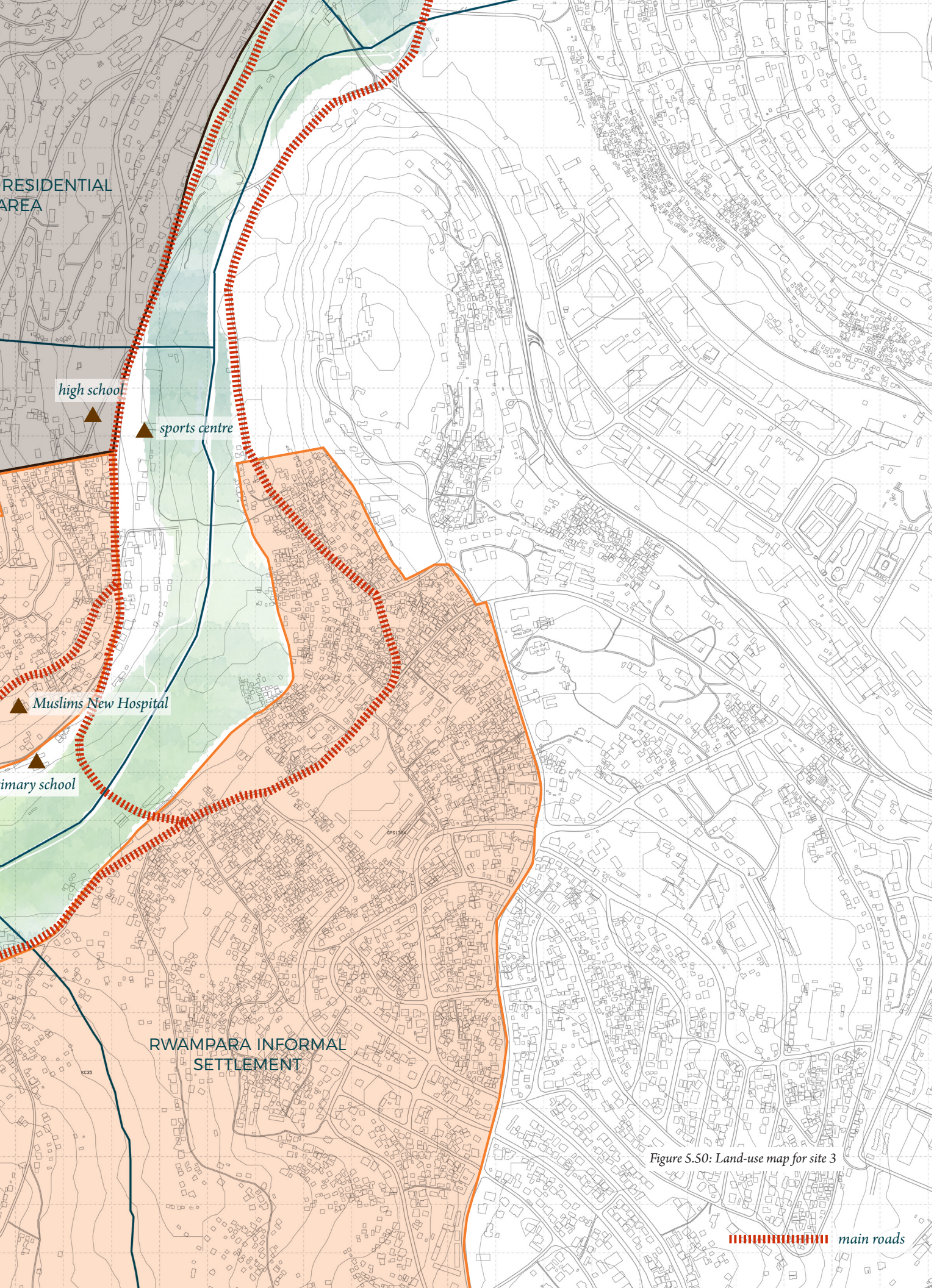
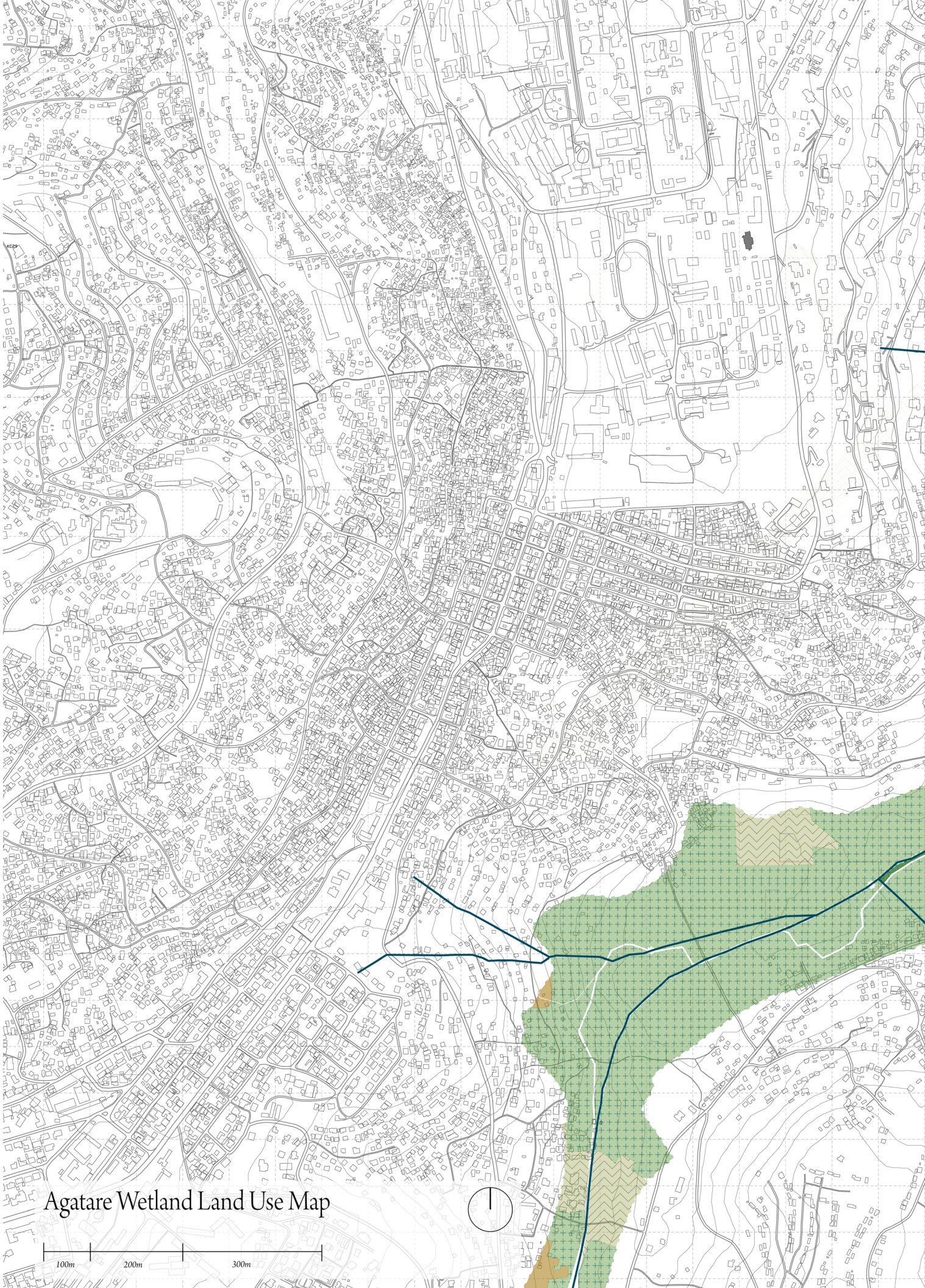


Figure 5.50: Land-use map for site 3


Agatare Wetland Land Use Map
100m
200m
300m

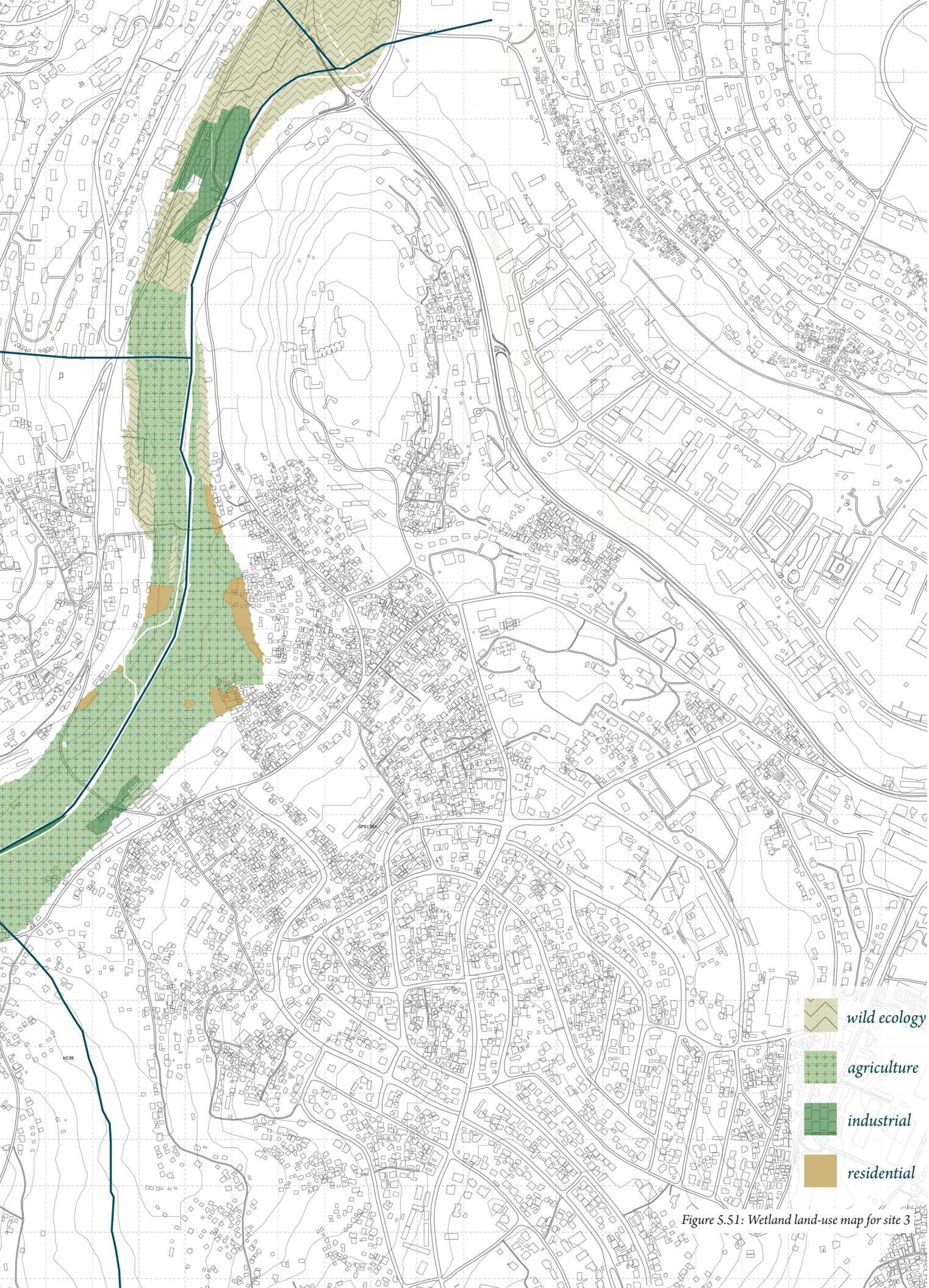


Figure 5.51: Wetland land-use map for site 3

run-off water moving
into Agatare wet
cemented water canal
Agatare Water Movement Map
100m
200m
300m

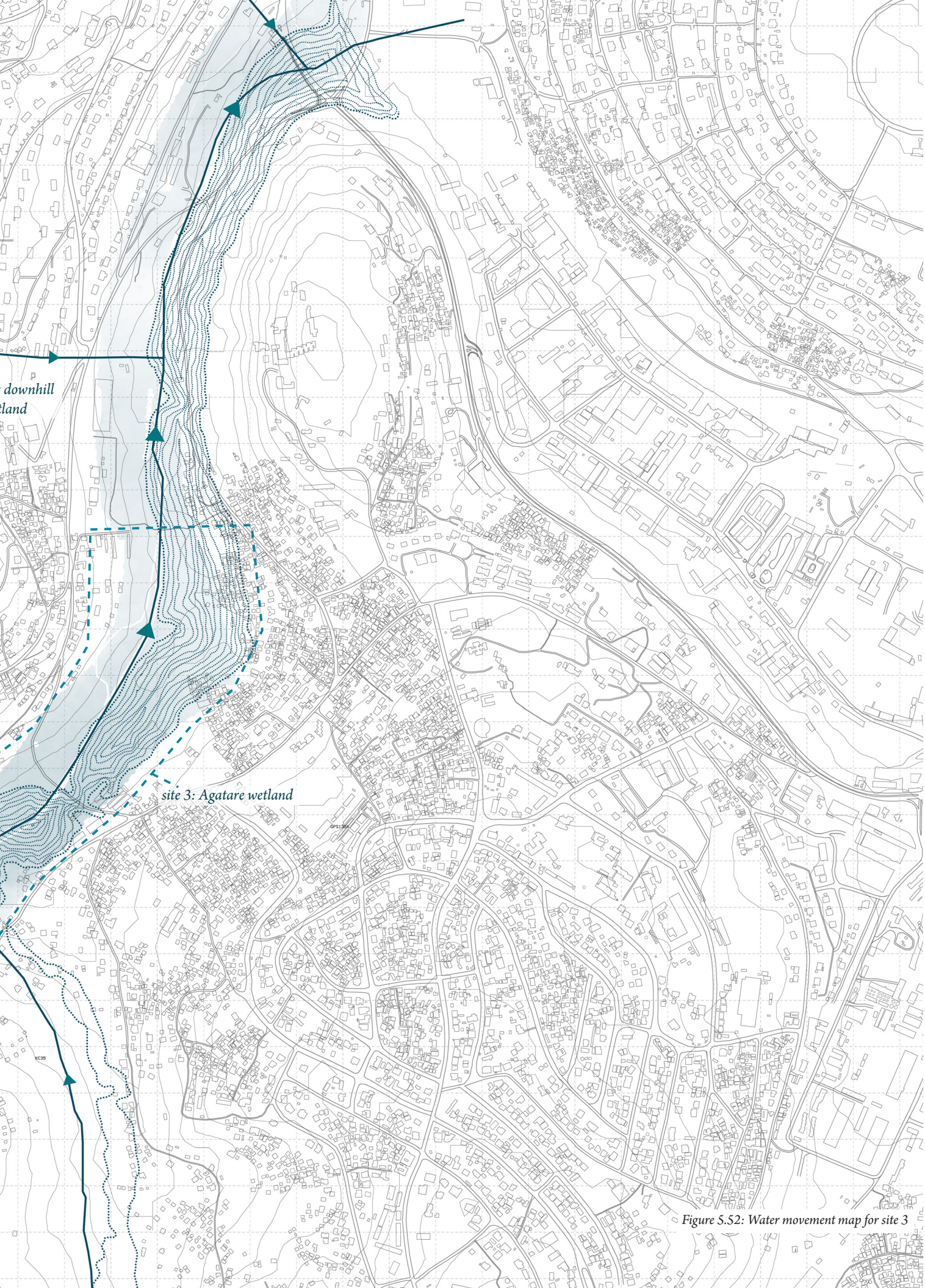


Figure 5.52: Water movement map for site 3

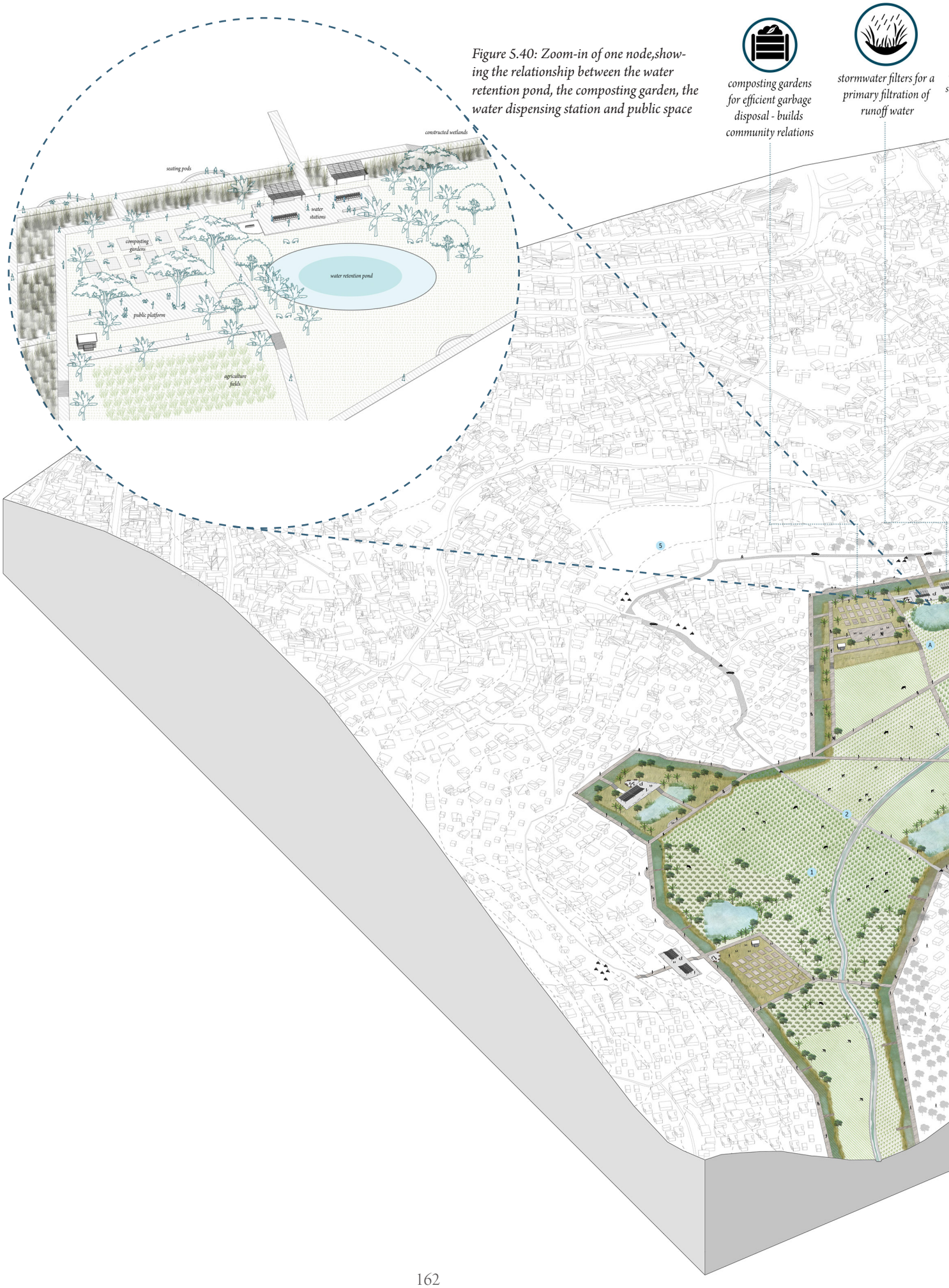


Figure 5.40: Zoom-in of one node,showing the relationship between the water retention pond, the composting garden, the water dispensing station and public space

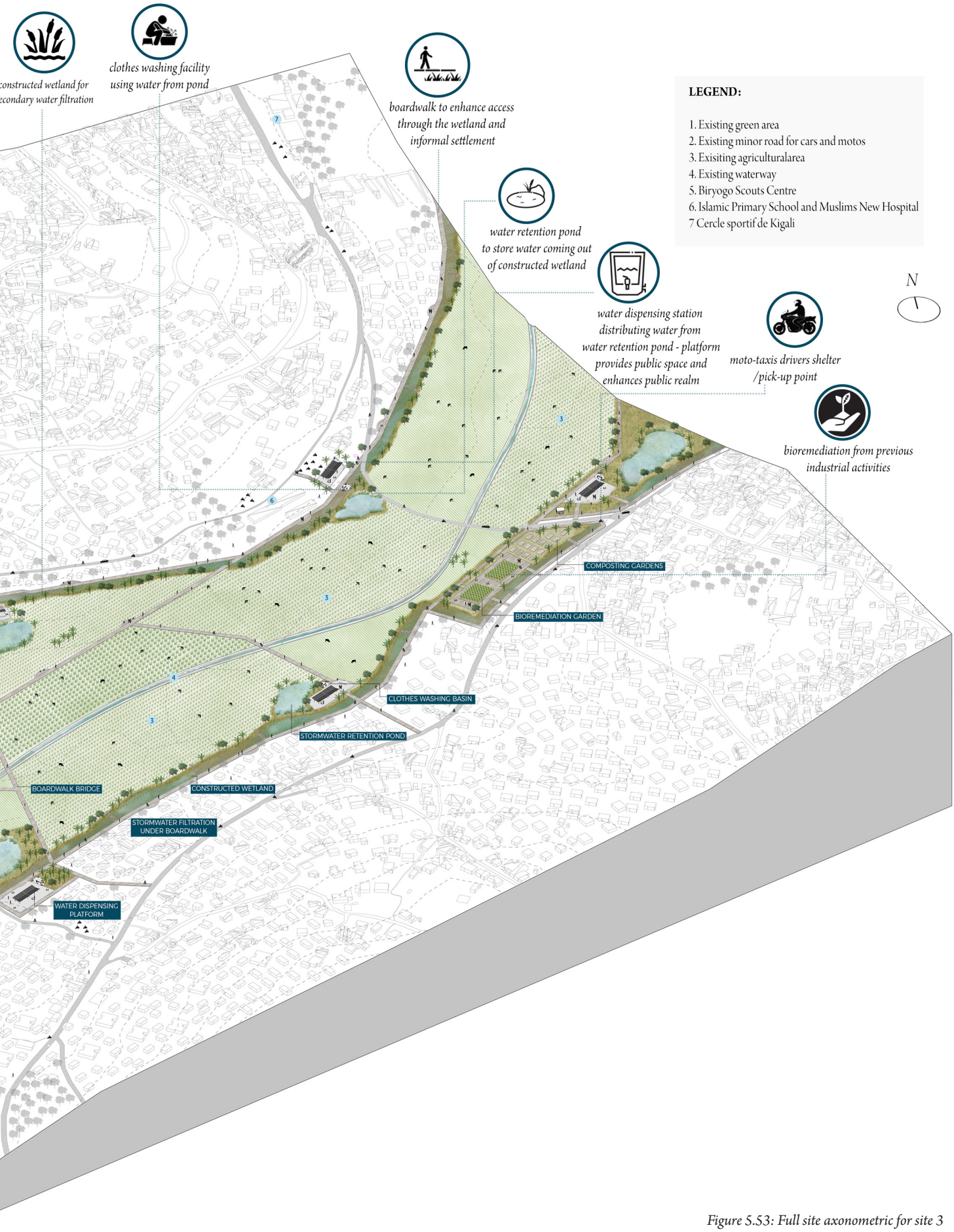


Figure 5.53: Full site axonometric for site 3

each node is located within 400m of each other for pedestrian friendly access

Figure 5.54: Diagram showing walkability between nodes

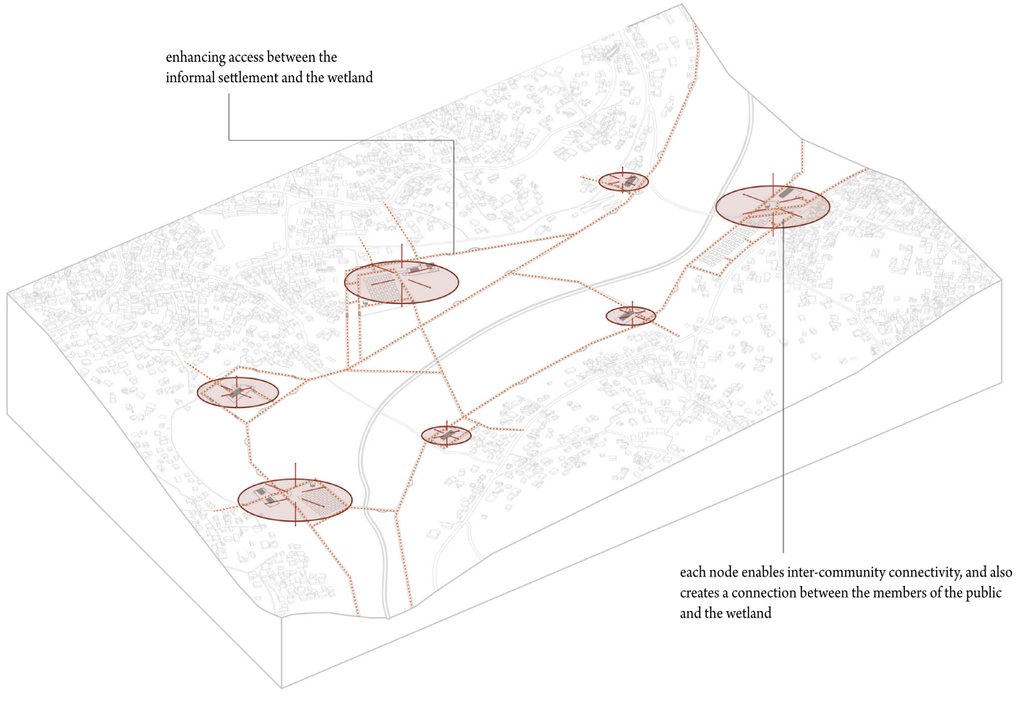
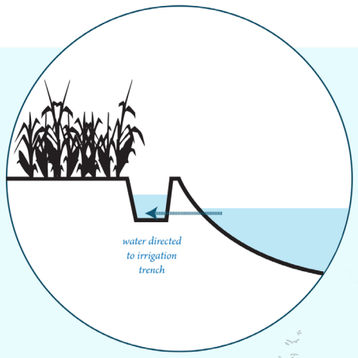
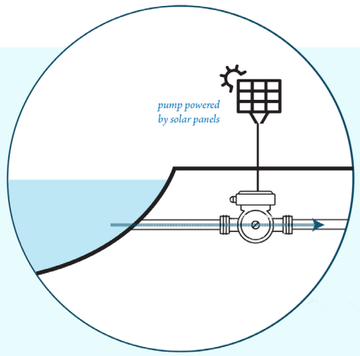


Figure 5.55: Diagram showing how the nodes act as catalysts for mobility within the informal settlement and the wetland

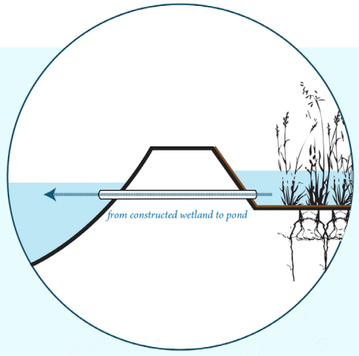
Figure 5.56: Site 3 Long section



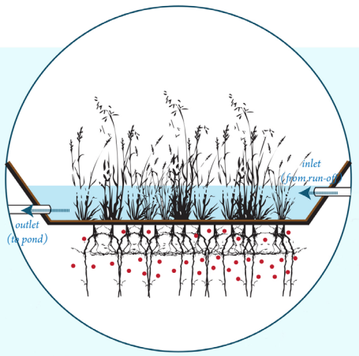
5. water from the pond can also be used for irrigation for the adjacent agricultural activities



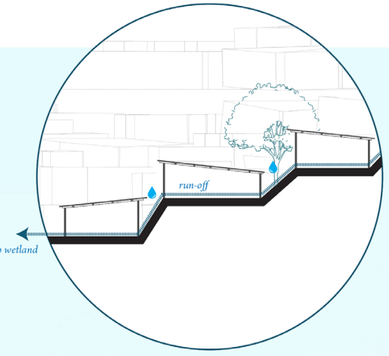
4. water is pumped to the water dispensing stations. It is passes through the water filters before distribution to the community.



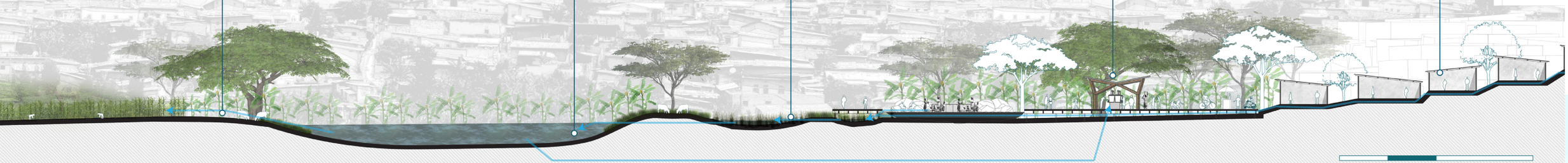
3. water is directed to a water retention pond to be stored



2. water percolates into a constructed surface flow wetland for secondary treatment through rhizodegradation



1. greywater / stormwater run-off from informal settlements into wetlands



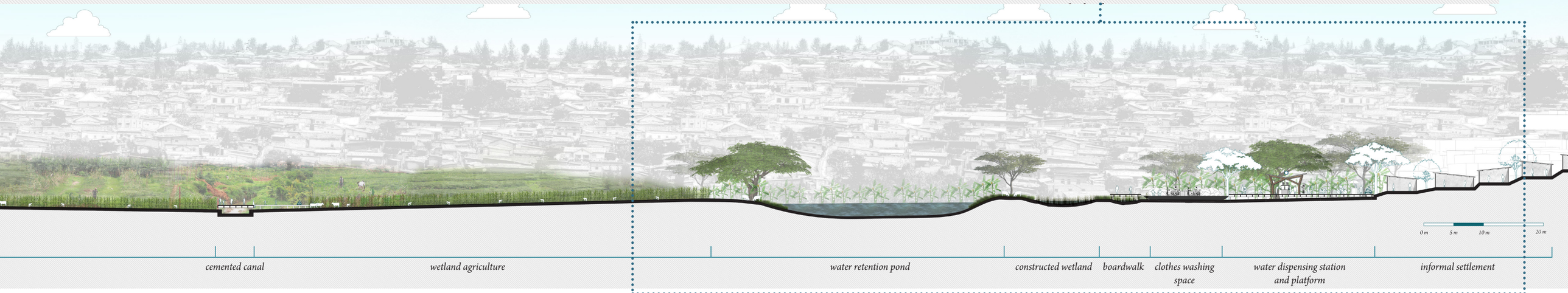


Figure 5.57: Artistic impression of the water dispensing station and composting garden overlooking the fields

5.5.4 Proposed site 4 – Gikondo Industrial Node

The Gikondo Industrial Node has been proposed as a demonstration of the application of the proposed framework to any given wetland site across the city of Kigali. This site is located within a wetland that has completely been encroached with industrial areas. These industrial areas have stopped to operate and are currently in the process of being relocated to the Special Economic Zone, located on the outskirts of Kigali.[124]

The main challenge concerning this site is the alarming state of pollution caused by the industrial activities, roads and other chemical-related practices carried out in the wetland.[125] According to the new masterplan implemented by the government, the Gikondo industrial wetland is set to be transformed into a wetland recreational park with an artificial lake, with the eventual aim of creating a park for eco-tourism.[126] As mentioned previously in Chapter 3, the criticism towards this approach is that the aims of the state are far too disconnected from the current established practices of the wetland users.

The Gikondo industrial wetland is bordered by the Gikondo informal settlement and the Kimihurura informal settlement. Amidst the crammed and run-down industrial area, a multitude of informal activities take place, namely grilled corn selling, cow pasturing, informal gatherings, among others. The Gikondo wetland, despite being very polluted, also acts as a source of water for the inhabitants of the surrounding informal settlements. Heavy vehicular circulation occurs within the wetland, which is a main artery for the passage of large industrial vehicles.

The land-use plan proposed through this thesis, primarily aims at re-establishing the ecological stability of the Gikondo wetland, while considering its current social importance. Here again, phytotechnologies will be adopted towards site remediation due to the practical, sustainable and effective implementation of those methods, as opposed to chemical applications. The main industrial area is planned to be planted with various types of plants that will aim to remediate the soil quality.

The first approach suggested is the multi-mechanism buffer, with the primary objective of providing the maximum amount of phytotechnology benefit in a small footprint without the need to harvest any plant material.[127] In this case, the proposal suggests a site perimeter buffer, with a mix of different plant species, which enhances soil stability, soil

124 Rwanda Environment Management Authority. 2018. "Detailed Sub-Catchment Management Plans for Gikondo and Nyabugogo Wetland Systems."

125 Ibid.

126 Ibid.

127 Kennen, Kate, and Niall Kirkwood. 2015. Phyto - Principles and resources for site remediation and landscape design. New York: Routledge.

Figure 5.58: Makeshift commercial spaces in Gikondo informal settlement

Figure 5.59: Abandoned industried in Gikondo wetland

Figures 5.60 and 5.61: Polluted water streams in Gikondo wetland

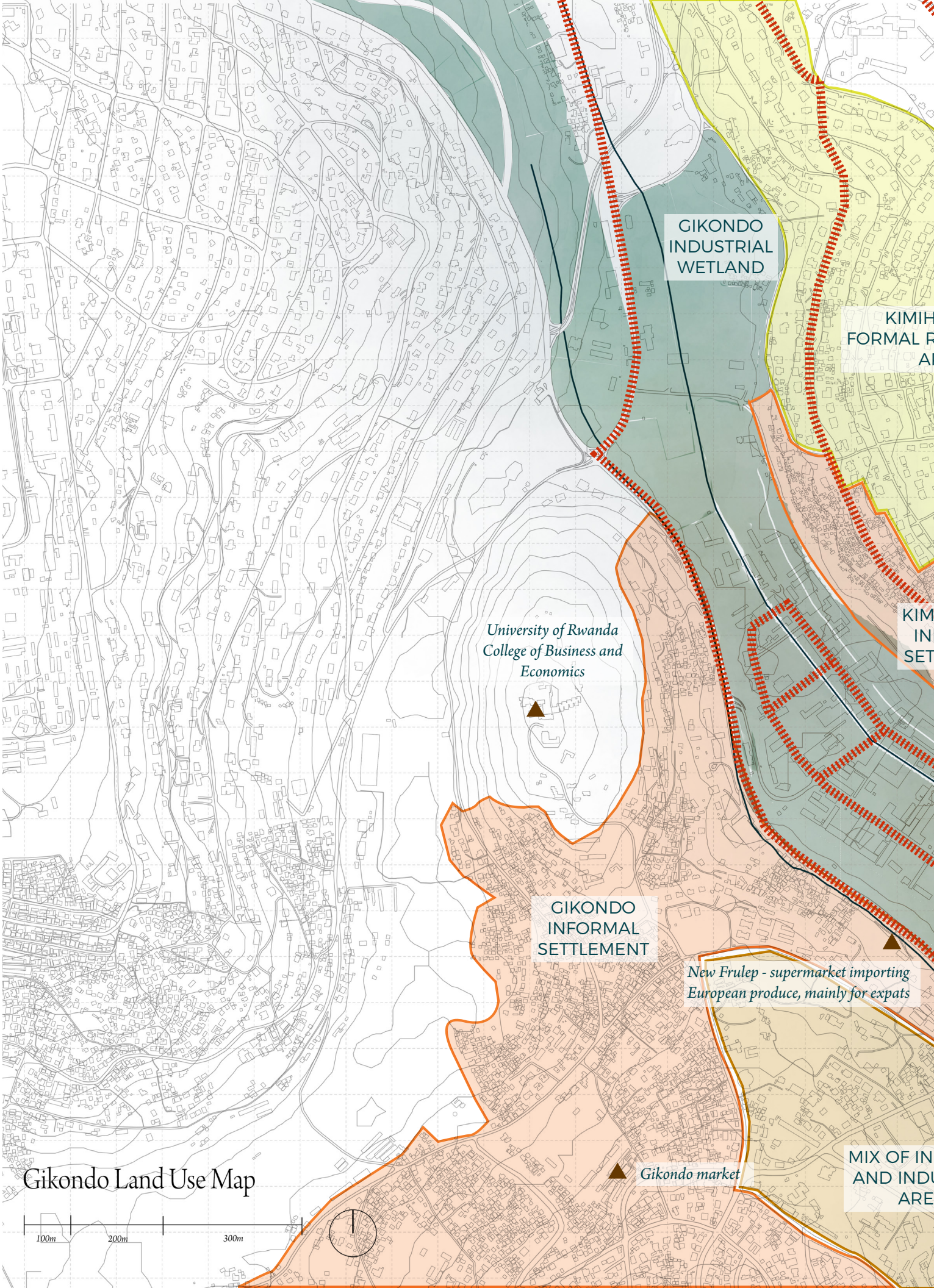
quality and also helps improve the air quality around the site. The site perimeter buffer also helps to keep the pollution impacts of site activities inside the footprint, limiting impact on neighbouring uses.[128]

The second suggested phytoremediation mechanism is the storm-water filter, designed to circumscribe the site to provide a primary filtration to the run-off water from the hillsides bordering the wetland. A system of surface-flow constructed wetlands has also been proposed to remediate the soil and water quality of the Gikondo wetland. The remaining surface area of the wetland shall be planted with a multi-mechanism mat, which is an area planted with a mix of plants to provide the maximum amount of phytotechnology benefit over a large area with mixed contamination, using low-height species. The planting mix shall be carefully selected to degrade organics and stabilise inorganics. The multi-mechanism mats should be cut and harvested at the end of each growing season to remove the maximum amount of pollutants from a site. This process could be transformed into a community exercise, where the harvesting of the plants become a part of the customary practices of the inhabitants.

Other activities proposed in the land-use plan are the extension of the Kimihurura market, which is currently located under a very basic structure, with poor accessibility. The primary customers of the market at the inhabitants of the Kimihurura informal settlement, but it is also common practice to the inhabitants of the upper-class neighbourhoods of Kimihurura to venture down the hill to shop at the market. Extending the market will hence provide better access and better spatial qualities to encourage people from all social classes to visit the market.

A craft hub has also been included in the proposal to foster the local businesses of food-selling and art-crafting within the wetland to cater for the existing socio-cultural activities and to encourage small economies. As a whole, the proposal for the Gikondo wetland complements the strategies adopted through sites 1, 2 and 3, while demonstrating the adaptability of the framework to any given wetland site throughout Kigali.

128 Ibid.



Gikondo Land Use Map

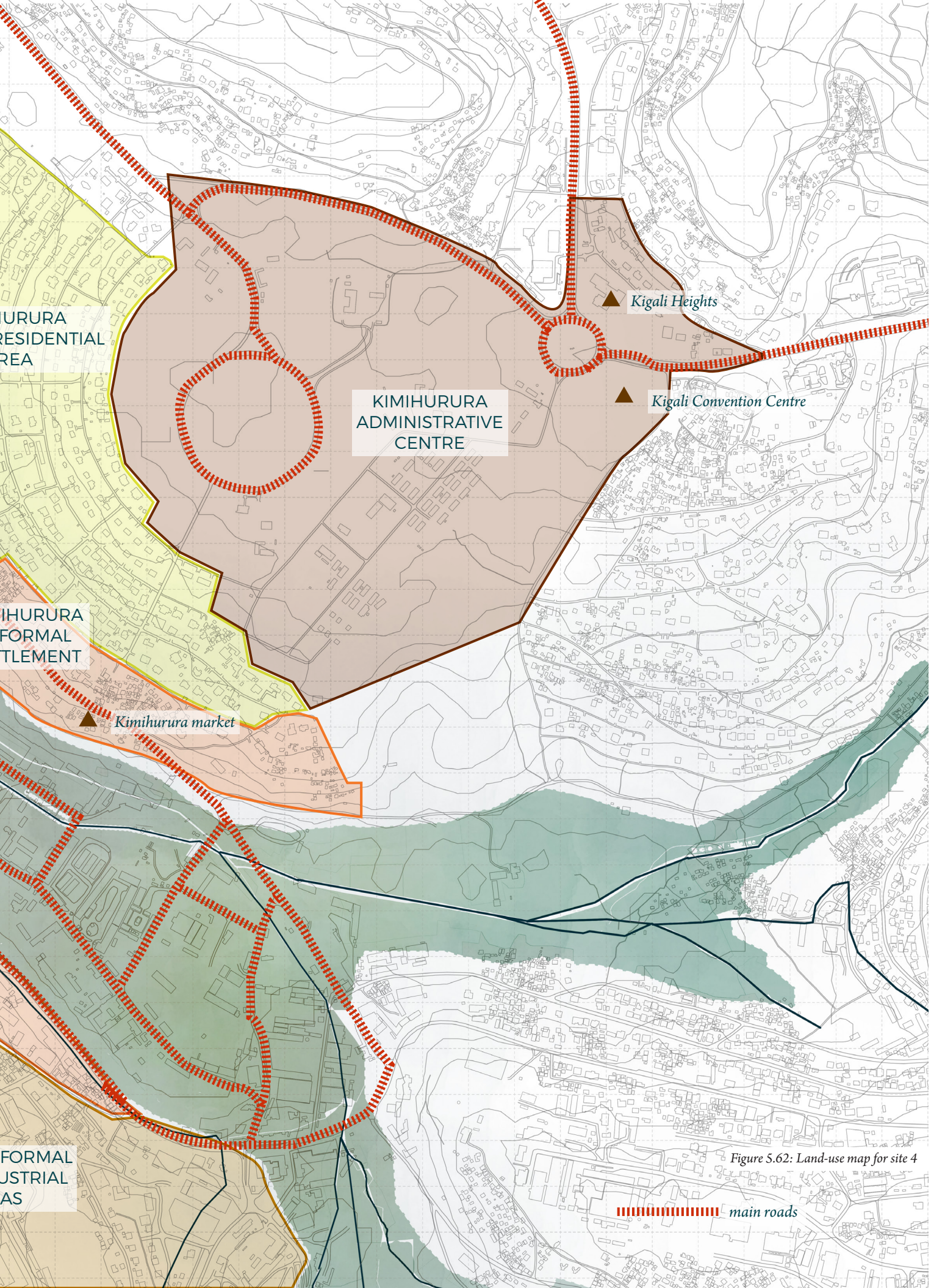
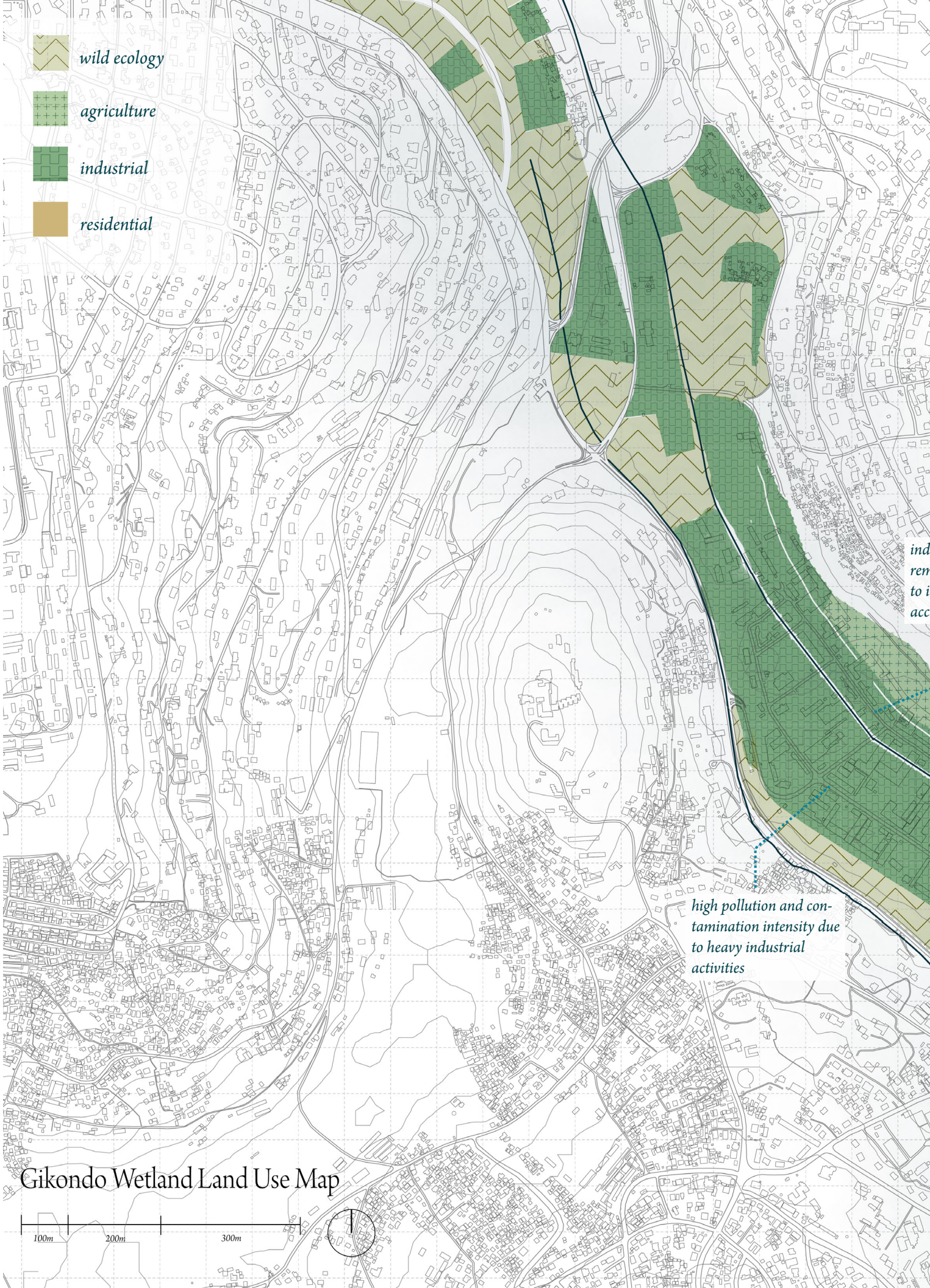


Figure 5.62: Land-use map for site 4



Gikondo Wetland Land Use Map

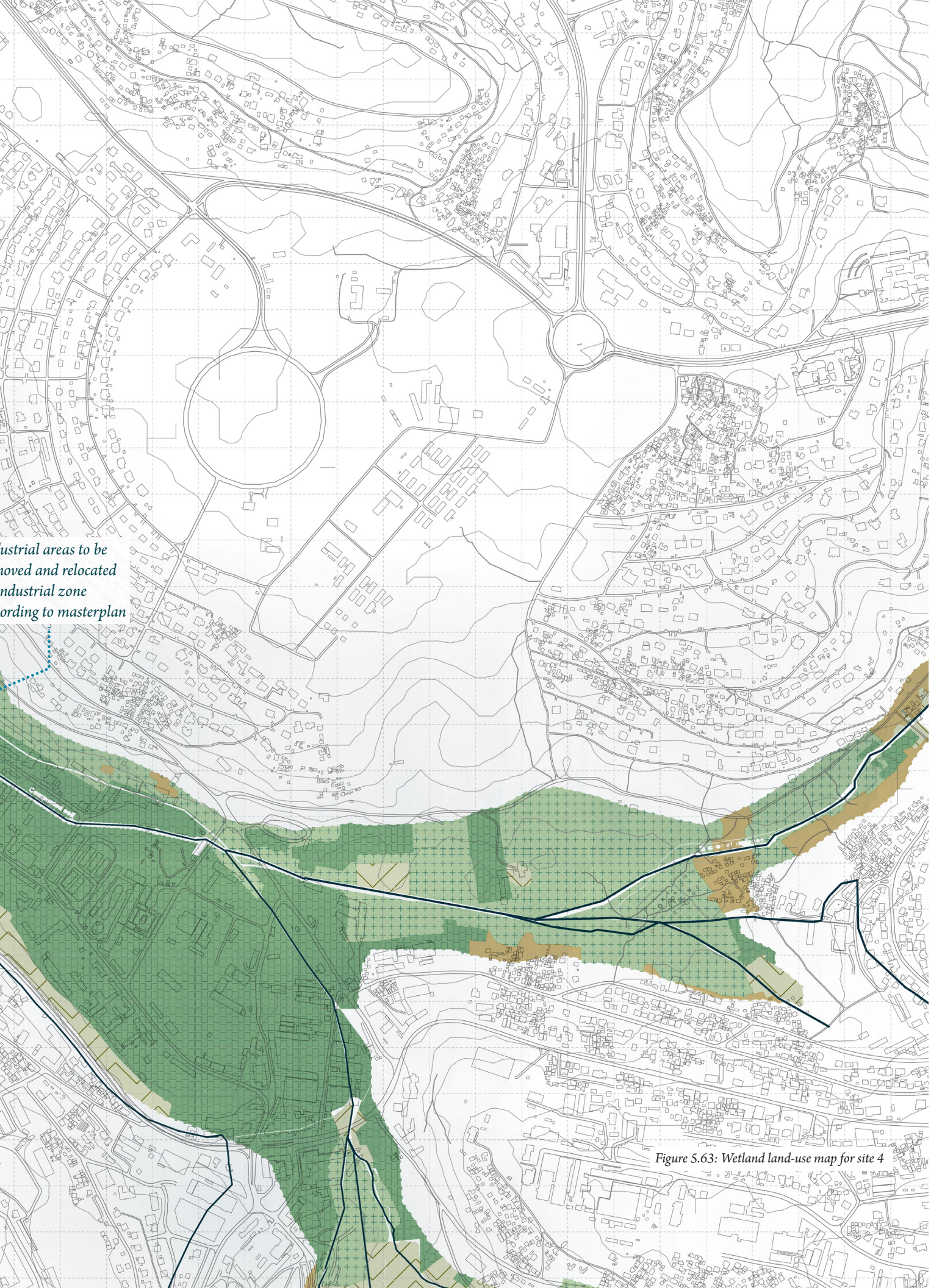
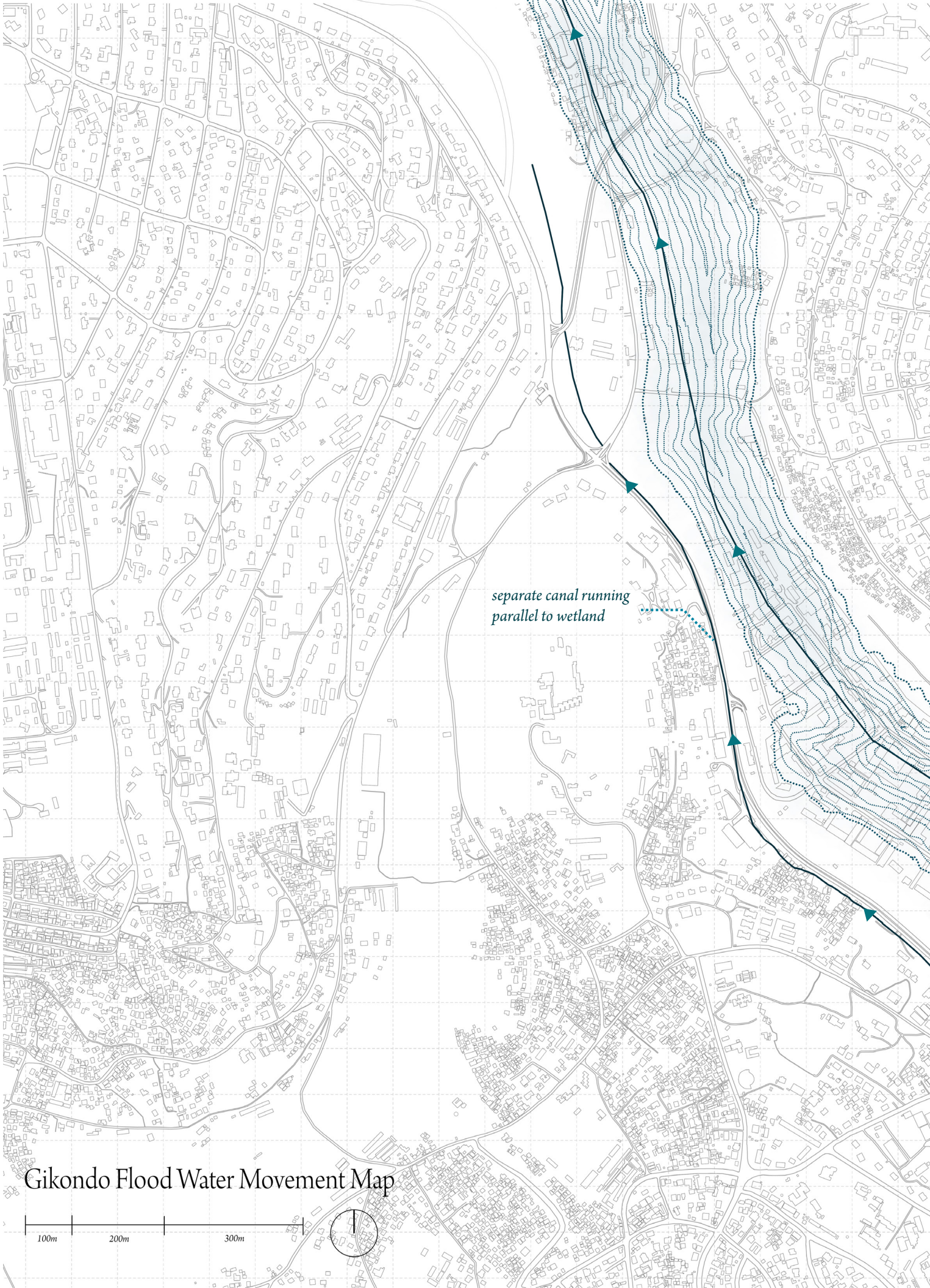


Figure 5.63: Wetland land-use map for site 4



Gikondo Flood Water Movement Map

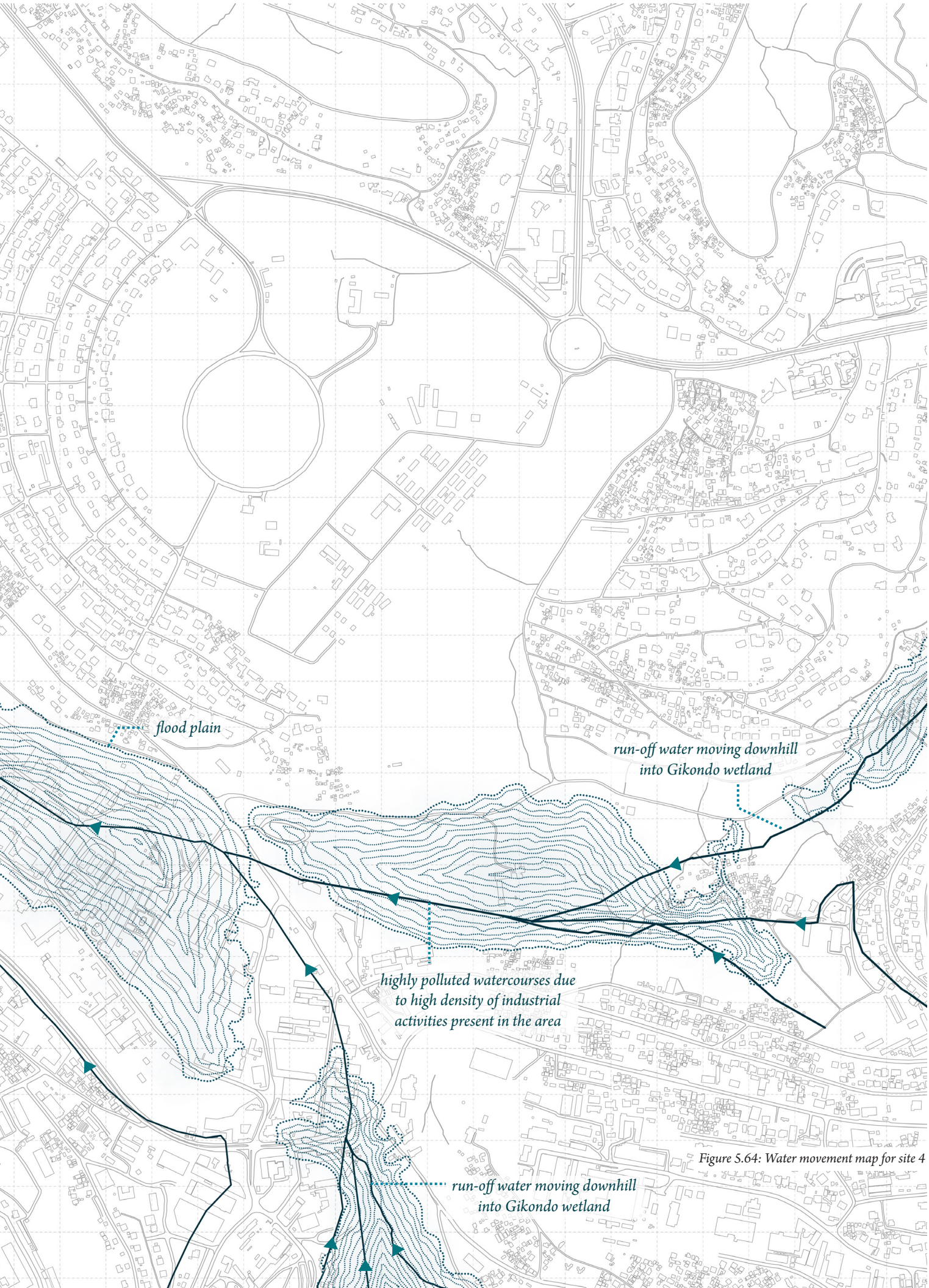


Figure 5.64: Water movement map for site 4

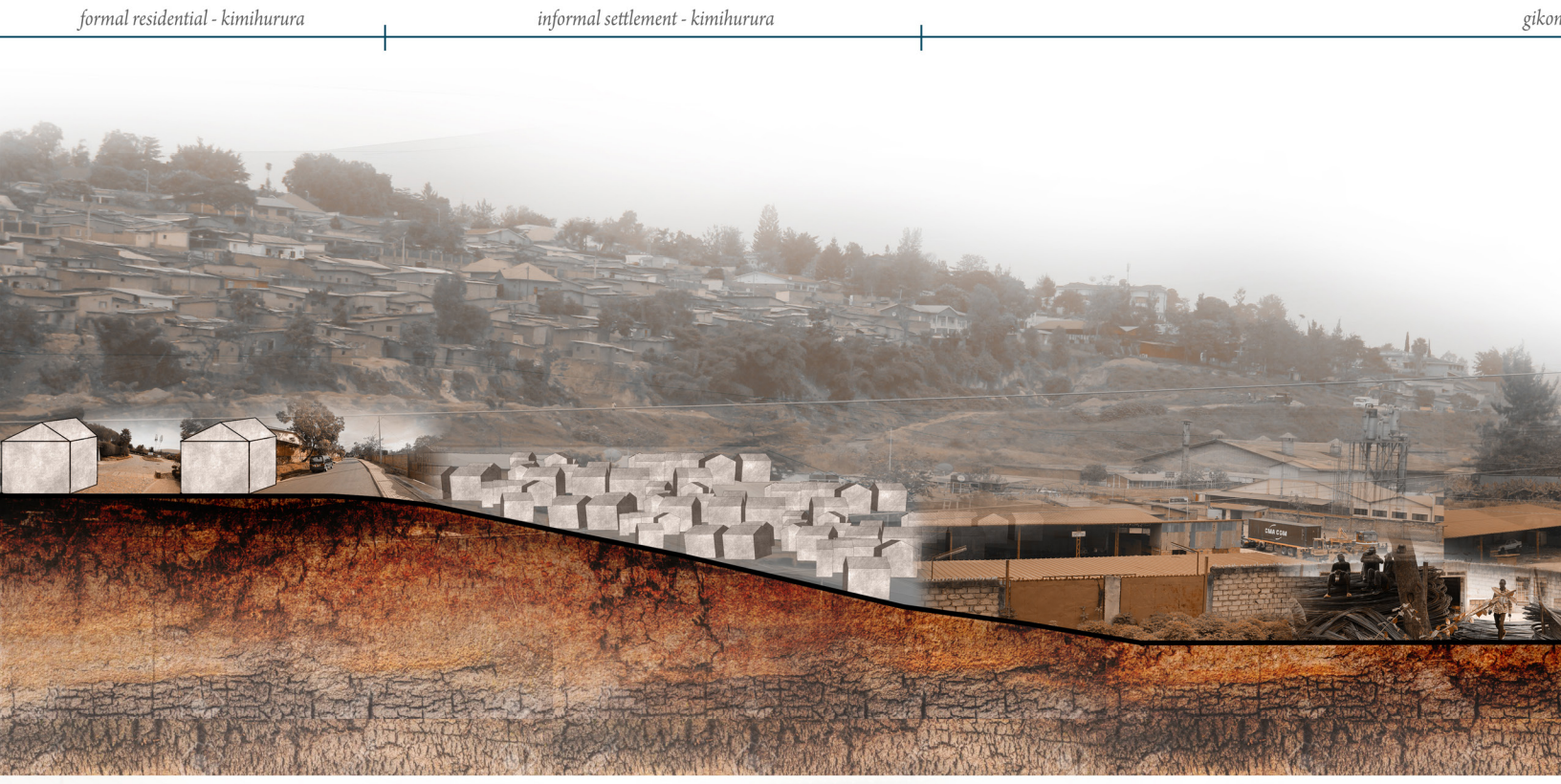


Figure 5.65: Gikondo industrial area section - existing conditions

ndo industrial park | *road* | *informal settlement - gikondo*

current state of pollution of Gikondo wetland

current industrial area to be remediated through phytotechnologies:

proposal for a park that remediates the ecological stability of the wetland through community engagement

phytoremediation techniques proposed:
- multi-mechanism buffer
- stormwater filters
- surface-flow constructed wetland
- multi-mechanism mat

stormwater filter

craft hub

craft hub as a platform to attract and boost the tourism industry as well as providing a source of income for local communities

multi-mechanism buffer

Proposed Gikondo Land Use

100m 200m 300m

current Kimihurura market

proposed extension of the Kimihurura market

proposed extension of the market to better serve both the informal settlement and make it more accessible for the inhabitants of the formal parts of Kimihurura to make us of the market

the market as a hub for community interaction

multi-mechanism mat with surface-flow wetland

Figure 5.66: Proposed land-use plan for Gikondo wetland

5.5 Implementation and Governance

The proposal of the Kigali Conceptual Master Plan presents the issues of the globalisation of today's urban developments, where the success of a certain strategy in a given place is assumed to be profitable in any context. In line with the current rising wave of urban governance in Kigali, it is important to tap into the unique presence of vernacular resources – social, material, ecological and economical – for a more responsive solution.

Kigali's urban dimension is currently presented with issues of weak urban infrastructure, deficient urban planning and implementation tools, uncoordinated management of human settlements and limited financial resources. In order to invert the current dynamics, and transform Kigali into a sustainable and inclusive city, it is important that effective urban governance is put into practice. This section serves to highlight an overview of how different urban governing actors might come into play towards materialising proposed design strategies.

According to Slack and Côté[129], urban governance plays a critical role in shaping the physical and social character of urban regions. It also influences the quantity and quality of local services and efficiency of delivery and determines the sharing of costs and distribution of resources among different groups. Methods of exerted urban governance affect residents' ability to access local government and engage in decision-making, influencing local government accountability and responsiveness to citizen demands.

Urban governance involves a range of actors and institutions; the relationships among them determine what happens in the city. In managing urban transformations, government (at all levels) need to play a strategic role in forging partnerships with and among key stakeholders. In the case of Kigali, urban governance has been classified under three main categories, namely community, environment and infrastructural and financial.

Figure 5.67 speculates some of the relationship between various stakeholders and the type of governing responsibility they would be associated with. The stakeholders have been classified into four main categories, namely central government, local government, state institutions and non-governmental bodies. Decentralisation is also a key aspect into ensuring that the development is managed in a more focused and concise way, by re-distributing decision-making authority from the central to the field offices of national ministries and intensifying regional governance.

129 Slack, Enid, and Andre Cote. 2014. Is Toronto Fiscally Healthy? Toronto: University of Toronto.

Various governance strategies could be implemented towards encouraging a more inclusive approach to urban development, and to provide adequate funding for this all-encompassing concept of urban planning. Incentives could be developed towards encouraging investors interested in the masterplan to contribute to the inclusive design approaches put forward in the previous section. One example could be by imposing a tax that will serve to provide funds directed towards improving the infrastructural systems in informal settlements, as per the design proposed throughout this thesis. This tax incentive will serve to make sure that amidst all the capitalist-driven developments, attention is still given towards improving the living conditions of the urban poor.

Social incentives should also be considered, where fast track or priority permitting could be allocated to developers of the 'masterplan projects' who ensure that socially inclusive components are involved in their proposed developments. Tax on the new buildings could also be directed to business incentive grants for informal dwellers, towards encouraging the generation of small economies, to eventually achieve financial stability and independence.

Zoning and by-laws could also help in the implementation of cultural hubs within the city, to promote the integration of local craftsmanship within the city's new development, and hence encourage the association of different social classes. Another example could be providing subsidies to farmers in agricultural wetlands to encourage the implementation strategies for pollution control. The provision of incentives, targeting both the residents of Kigali and the business-owners, shall also aid at involving local actors to a maximum, to eventually encourage large nodes of investment.

Finally, Figure 5.68 provides a breakdown of the different governing bodies - both public and private – involved in the implementation of the design strategies elaborated through the previous sections.

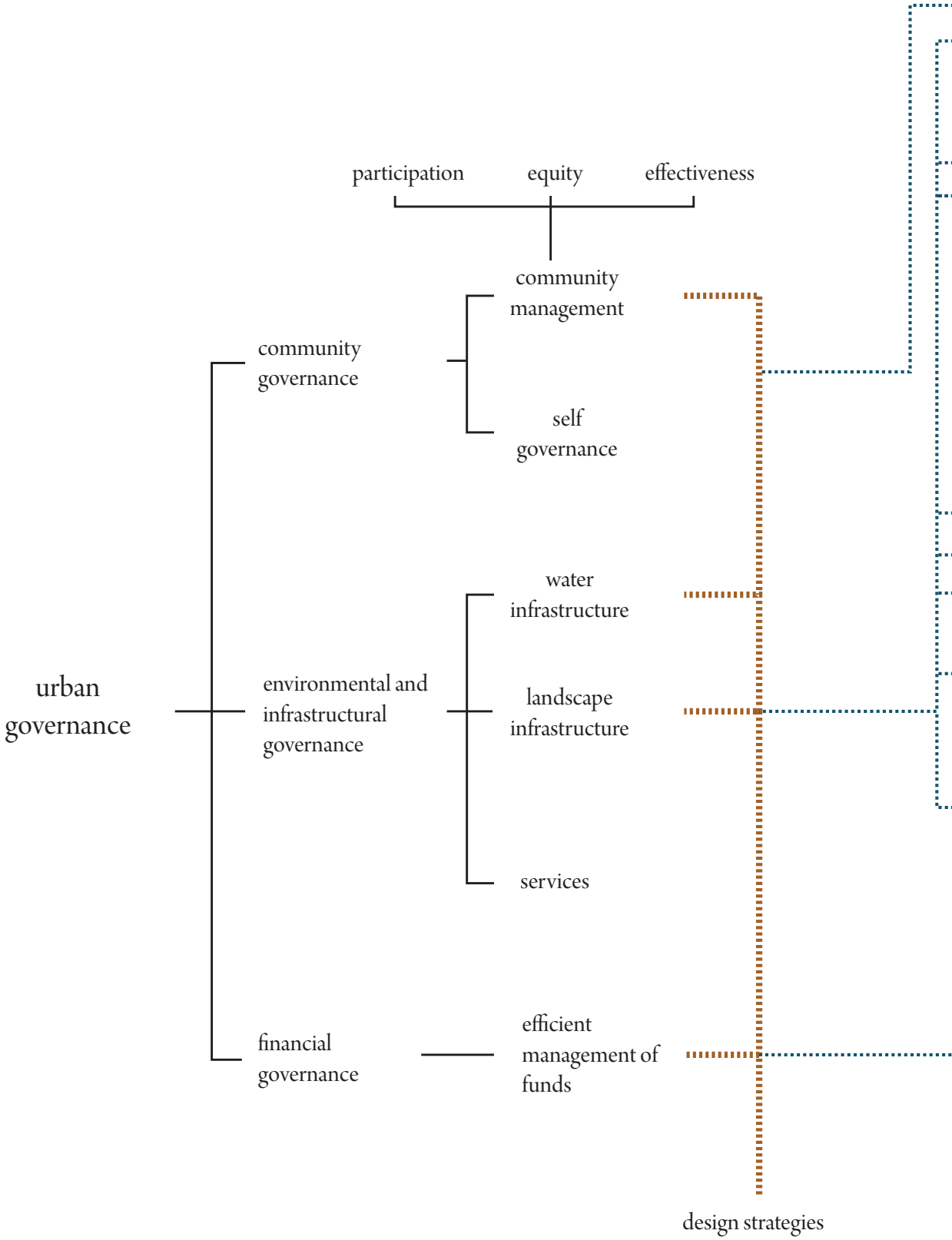


Figure 5.67: Kigali Governance map

central government:

- Ministry of Local Government
- Ministry of Agriculture and Animal Resources
- Ministry of Foreign Affairs and Cooperation
- Ministry of Finance and Economic Planning
- Ministry of Infrastructure
- Ministry for Environment

local government:

City of Kigali - governed by the Executive Committee

state institutions:

- Rwanda Environment Management Authority (REMA)
- Rwanda Development Board (RDB)
- Rwanda Utilities Regulatory Authority (RURA)
- National Bank of Rwanda
- Rwanda Agricultural Board (RAB)

non-governmental bodies:

- Global Green Growth Institute
- USAID
- Uzima Water Filters
- Food and Agricultural Organisation
- United Nations Development Programme

private stakeholders — local; foreign

policy makers — efficient policies to drive sustainable change; incentives

BODIES INVOLVED

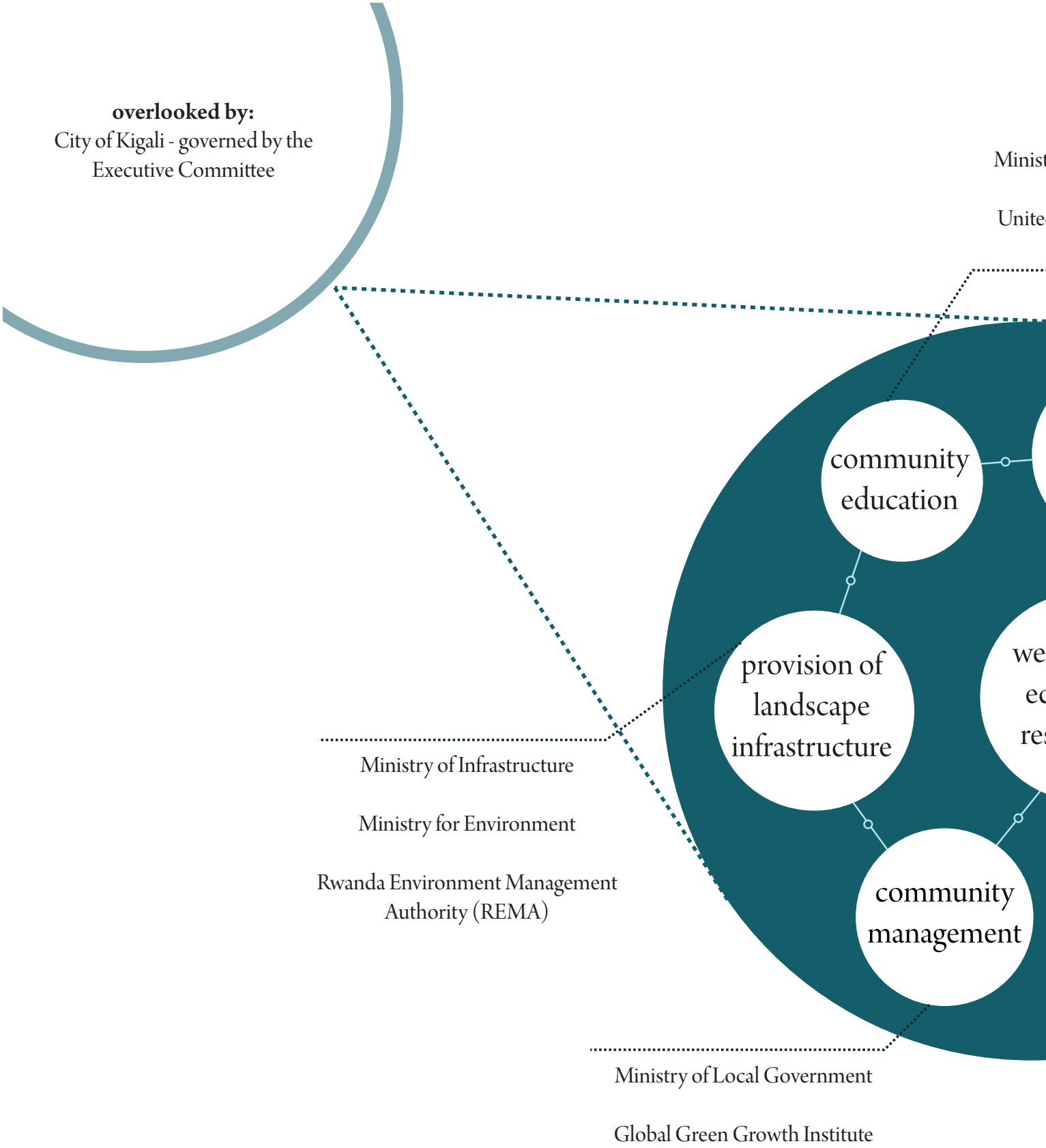


Figure 5.68: Design implementation diagram

try of Local Government

d Nations Development Programme

Ministry of Infrastructure

Ministry for Environment

Rwanda Environment Management Authority (REMA)

Rwanda Development Board (RDB)

Rwanda Utilities Regulatory Authority (RURA)

provision of water infra-structure

tland and cological storation

Ministry of Agriculture and Animal Resources

Ministry for Environment

Rwanda Environment Management Authority (REMA)

Rwanda Agricultural Board (RAB)

PROPOSAL

management of funds:

Ministry of Finance and Economic Planning

National Bank of Rwanda

CONCLUSION

Navigating through Peaks and Valleys is a work about re-describing the specificities of urban life through design. Emerging, makeshift urbanites live in conditions that require drawing new lines around and between specific systems to eventually bring about integrity. Although collective forms are only temporal, it is crucial to constantly re-iterate new ways of articulation and convergence that will enable divergent communities to feel complemented by each other, and deeply ingrained in the urban realm.

The city of Kigali was of particular interest for this thesis due to its current approach to post-trauma reconstruction, which favours wiping the slate clean and sending every wound to oblivion. Despite the sense of physical conflict being no longer palpable, the grim history still plays out within the city, in a more passive and subtle manner. While there is an intrinsic tendency from the state to utilise the geopolitics of fear as a strategic card, this thesis advocates for the implementation of the geopolitics of hope, where compassion and cohesion lie at the frontline of the proposed strategies of revitalisation. This work also operates on the basis of a politics of knowledge, which acknowledges the power of the latter, and where design and infrastructure provide the necessary connections for the transmission of information. Inducing a sense of contextual awareness in members of Rwandan society is crucial towards achieving proactive communities and creating future opportunities.

In a mindset where developing nations tend to dwell on the erroneous concept that modernisation is the key to unity and proper functionality, this is a call to steer away from the one-size-fits-all urbanisation, where 'new', 'modern' and global models of urbanisation are often seen as a quick fix. The proposed framework hence focusses on creating sustainable inter-relationships between the informal life and other major components of the urban structure. It offers the possibility for Kigali to thrive on the potential of its inherent ecosystem, to eventually generate and contextually reactive landscape that minimises the demand for costly infrastructure.

The schemes elaborated also show that incremental and tactical urban developments can happen in concomitance with invest-driven development. This work provides a platform for common ground between the two sides of the urban paradox.,towards an adaptation of current strategies of master planning, for a more contextually-responsive approach. Amidst conditions of significant socio-economic differences, wetland degradation and pollution, and a lack of adequate sanitation and water supply, suggested design strategies provide more responsive and adaptive means that foster substantive

collective interchange and breaks away from the monopolising effect of the prevailing techniques of urban revitalisation.

In the midst of a rapidly expanding urban realm, this proposal goes against the globalisation and standardisation of urban regeneration strategies. Instead, this thesis seeks an approach that will mine the complex ways in which neighbourhoods are produced in order to inform architectural and urban strategies that can be integrated within the spatial production of the city.

This proposal furthers a thesis based upon comprehending the dynamics of an emerging society, while using architecture as a mediator towards fostering the inherent relationships between the ecological, social, cultural and economic aspects of the urban fabric. The strategies shall engage with the community through social empowerment and catalytic interventions, as well as active public participation. The interventions not only empower the population to model their community physically, but most importantly to build strong inter-personal relationships. Those relationships constitute the strongest underlying foundation that any society ever stood upon.

Figure 6.01 (next page): Busy Nyabugogo centre, which is a perfect depiction of the 'order in chaos' atmosphere that reigns in African urbanities

212 ROYAL
RAC 486P
ALPHA
VIRGIN
KILLED

SAGER GANZA
Letshego
TVS

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