



Mukuru Kwa Njenga Slum Upgrading Project

Mukuru Kwa Njenga Slum Upgrading Project

Nairobi, October 2012

**Centre for Urban Research and Innovations(CURI). University of Nairobi.
In collaboration with:**

**Akiba Mashinani Trust (AMT), Muungano Suport Trust (MuST), Muungano wa wanavijiji and the
Mukuru Kwa Njenga Community**

CENTER FOR URBAN RESEARCH AND INNOVATIONS

Department of Urban & Regional Planning
School of the Built Environment
University of Nairobi
P.O. Box 30197 Nairobi, Kenya
Tel: +254 20 2711574, Mobile: +254 722658781
Email: uip@uonbi.ac.ke
www.centerforurbaninnovations.org

Copyright 2013 Center for Urban Research and Innovation, University of Nairobi

ISBN

Design and Layout: Zeltia G.Blanco

Printing: Resources International

Front and Back Cover Photos: Zeltia G.Blanco

TEAM

Director: Peter Ngau

Supervisor: Charles Karisa

Team leader: Zeltia G.Blanco

GIS and Mapping personnel: James Wanyoike

Research Assistants: Eric Mwilaria, Nasra Omar, Bonnie Onyango

In collaboration with:

Akiba Mashinani Trust (AMT)

Muongano Suport Trust (MuST)

Muongano wa wanavigigi

Mukuru Kwa Njenga Community

Principal Authors: Zeltia G.Blanco, James Wanyoike, Eric Mwilaria, Nasra Omar, Bonnie Onyango

Colaborations: Peter Ngau, Charles Karisa, Jacinta Mbilo

Graphs: Eric Mwilaria, Nasra Omar, Bonnie Onyango

Maps: James Wanyoike, Zeltia G.Blanco

Administrative assistance: Jacinta Mbilo

Photographs: Zeltia G.Blanco, Eric Mwilaria, Nasra Omar, Bonnie Onyango

TABLE OF CONTENTS

ACKNOWLEDGEMENT	v	5. URBAN PLANNING PROPOSAL DRAFT	38
PREFACE.....	vi	5.1. Upgrading strategy	39
FOREWORD	vii	5.2. Urban approaches	41
EXECUTIVE SUMMARY.....	viii	5.3. Program of accommodation.....	48
01.INTRODUCTION	01	5.4. Housing.....	51
1.1. Problem statement.....	01	REFERENCES	57
1.2. Objectives.....	01		
1.3. Location	01		
1.4. History of Mukuru slum.....	03		
02.METHODOLOGY.....	05		
2.1. Research design.....	06		
03.LITERATURE REVIEW.....	07		
3.1. Slums and slum upgrading	07		
3.2. Evictions and tenure insecurity	07		
3.3. Legislative and policy documents guiding the project	07		
3.4. Initiatives on slum upgrading in Kenya	08		
04. SITUATION ANALYSIS	08		
4.1. Natural Environment and pollution.....	09		
4.2. Population	12		
4.3. Social and political Structure.....	13		
4.4. Housing and Housing Typologies.....	14		
4.5. Economic activities	16		
4.6. Roads and circulation	18		
4.7. Water and sanitary infrastructure	20		
4.8. Human Waste Management	22		
4.9. Solid Waste Management	24		
4.10. Sewerage	24		
4.11. Energy: electricity and cooking fuel	26		
4.12. Household expenditure.....	28		
4.13. Community facilities.....	28		
4.14. Land use and ownership system.....	31		
4.15. Suitability analysis	44		
4.16. Population projection	37		

List of Maps

Map 1.3.2. Sub-Location Map. Source: UIP 2012	10
Map 1.3.1. Mukuru Kwa Njenga Location Map. City of Nairobi	12
Map 1.4.1. Mukuru Kwa Njenga Historical Map. Year of creation of the villages	14
Map 4.1.1. Mukuru Kwa Njenga Slope analysis	19
Map 4.1.2. Environmental Map. Levels of garbage pollution.....	22
Map 4.6.1. Road infrastructure and people flow	28
Map 4.7.1. Water points and water informal infrastructure	30
Map 4.8.1. Sanitation (Toilets.....	32
Map 4.10.1. Sewer lines	34
Map 4.11.1. Power lines.....	36
Map 4.13.1. Facilities	39
Map 4.14.1. Land use and land ownership.....	41
Map 4.15.1. Suitability analysis.....	44
Map 4.15.2. Suitable land.....	45
Map 5.2.1. Mobility and Communications proposal	53
Map 5.2.2. Clustering and Densities Proposals.....	55
Map 5.3.1. Facilities and Open Spaces Proposal	59

List of Tables

Table 01. Garbage disposal per village. Average of 20 interviews per village	08
Table 02. Population from KNBS Census, UIP estimations and MuST enumeration. .	11
Table 03. Average monthly expenditure on electricity as per respondents	25
Table 04. Household average expenditure per month in rent and services	27
Table 05. Formal land use.....	31
Table 06. Current informal land use	32
Table 07. Area covered by the different business typologies	32
Table 08. Suitability analysis.....	23
Table 09. Population, households and expected densities for 2012-2030	36
Table 10. Land Budget according the three different approaches (2012 and 2030....	37
Table 11. Houses achievable with the different plot ratios per year of projection	37
Table 12. Residential program of accommodation.....	47
Table 13. Social facilities allocation sizes.....	48
Table 14: Average Percentages of No. Of People per Household.....	50

Table 15. Housing typologies, area per typology and total constructed area needed according to the different scenarios.....	50
---	----

List of Charts

Chart 01.Amount made per day as per respondents. Source UIP 2012.....	15
Chart 02.Opportunities for the businesses in future as per respondents.....	15
Chart 03. Water availability as per respondents	20
Chart 04. Water Quality as per respondents	20
Chart 05. Proximity of toilets according to villages as per respondents	21
Chart 06. Means of human waste collection as per respondents.....	22
Chart 07. Means garbage disposal as per respondents	23
Chart 08. Method of distribution of electricity as per respondents.....	24
Chart 09. % of Households with electricity in villages as per respondents	26
Chart 10 . Perception of security within villages as per respondents	30
Chart 11 . Land availability.....	32

List of Figures

Figure 01: Mzee Njenga, one of the starters of Mukuru Kwa Njenga.
Figure 02. The various stages of Mukuru Slum Upgrading Project: Fieldwork (up), Situation analysis (down-left) and upgrading and urban planning proposal (down-right)
Figure 03. Kibera KENSUP. Soweto A under construction.
Figure 04. Kambi Moto Slum upgrading project.
Figure 05. Dumping Site in Ngong River near Sisal.
Figure 06. Daily life in Mukuru Kwa Njenga
Figure 07. Meeting with the elders, chairmen and chairladies of Mukuru Kwa Njenga.
Figure 08. Youth Group in SIsal.
Figure 09-right. Typical floor plan of a structure.
Figure 10-left. Typical structure corridor.
Figure 11. One floor Mabati structures. Riara.
Figure 12. Wood structures with thatched roof.
Figure 13. Wood structures in Zone 48.
Figure 14.Vertical Orientation of buildings.
Figure 15. Stone, mud & metallic net technique.
Figure 16. High-rise structures in Motomoto.

Figure 17. Business typologies in Mukuru Kwa Njenga. (left- right, up-down) Fries vendor, kiosk, chapaty vendor, butchery, Tailor, green grocery, hair dresser, flowers vendor, charcoal vendor, vegetables shop, pharmacy kiosk, Pharmacy shop

Figure 18. Wall separating Riara village from Imara Daima Estate. Barrier

Figure 19. (left) Chamber with meters in Riara.

Figure 20. (right) Water illegally taped in Emba-villa.

Figure 21. (left) Polluted Water point In Vietnam.

Figure 22. (right) Water pipes passing through the open sewage line in Moto Moto.

Figure 23. (up left) A row of toilets along near the railway and under high transmission electricity lines.

Figure 24. (top right) Choo initiative for small spaces.

Figure 25. (bottom) Embakasi Girls ambulance parking and men pushing the manual exhauster through a muddy road in Riara.

Figure 26(left): stream and open sewage in its way between Milimani and Zone 48.

Figure 27 (right): open drainage collapsed. Source: UIP 2012.

Figure 28: High voltage line over the households in Sisal.

Figure 29: Day to day in Mukuru Kwa Njenga.

Figure 30. A non-formal primary school in Wapewape.

Figure 31. Children Playing on the Pipeline field.

Figure 32. Mukuru Kwa Njenga inhabitants in Riara village.

Figure 33. UIP team with representatives of Mukuru Kwa Njenga community.

Figure 34. Urban layout following the Structure Plan.

Figure 35. Urban layout following the Sewer lines and Structure Plan.

Figure 36. UIP first drafts Mukuru Kwa Njenga Upgrading Project.

Figure 37. Road Typologies proposal .

Figure 38. Bloking layout proposal draft.

Figure 39. Block design concepts .

Figure 40. UIP drafts of facilities maps Mukuru Kwa Njenga Upgrading Project.

Figure 41. Interlocking Stabilized Soil Blocks.

Figure 42. Interlocking Stabilized Soil Blocks.

Figure 43. Housing layout.

ACRONYMS

AMT

Akiba Mashinani Trust

CBO

Community Based Organization

CCN

City Council of Nairobi

CURI

Centre for Urban Research and Innovation

GSU

General Service Unit

MuST

Muongano Suport Trust

NAWASCO

NAWASCO

NGO

Non-governmental organization

UIP

Urban Innovation Project

ACKNOWLEDGEMENT

We would like to express our gratitude to everyone who was involved in the preparation of this research project. First we would wish to thank the UIP [Urban Innovation Project] of the University of Nairobi for making this research viable through the provision of the necessary material required to accomplish the project. Secondly, we would like to appreciate the efforts of MuST (Muungano Support Trust) and Muungano Wa Wanavijiji for providing us with information as well as mobilizing some community members who assisted us during the research process. We specially acknowledge local leaders and guides that have participated during this research process and facilitated the fieldwork, as well as residents of Mukuru that have kindly collaborated providing information in the different fields of study. We also extend much appreciation to AMT for availing information which was important for the research.

It is the efforts of all those above that Mukuru Kwa Njenga now has a blueprint for reference while implementing any upgrading actions for their settlement. The actualization of the project and accomplishment of its objectives will depend on the collective effort by all these parties.

FOREWORD

Providing a decent living environment for the urban poor in developing countries remains a complex undertaking of multifaceted nature; this is especially so where the concept of human settlement is viewed as both product and process. The situation is further complicated by lack of finance, access to land, security of tenure, and restrictive regulatory bottlenecks. Dwindling support for research in human settlements, especially housing for the poor has had a coupling effect to the indifference that interventions in this area have yielded. Together, these deficiencies seem to induce a vicious cycle; yet the situation can be improved significantly with the right attitude and commitment. This report on Mukuru, undertaken by CURI in partnership with AMT, MuST, and Muungano wa Wanavijiji, adopted an investigative approach to expose, but also attempt to address, the problematic situation engendered by inaccessibility of land for housing the urban poor; insecurity of tenure; the disconnect between formal (government-led) and alternative approaches to settlement upgrading and housing delivery; and the failure to embrace a truly participatory approach in seeking appropriate solutions for sustainable urban planning and better livelihoods.

The timeliness of this work cannot be overemphasized, Kenya being a signatory of numerous human rights based conventions in areas that include housing and water and sanitation. Key national policies in Kenya, including those touching on slum interventions have been aligned to key universal policies such as the Millennium Development Goals. AMT and partners remain committed to the plight of the inadequately housed urban communities living in the informal settlements, through research and innovative interventions. We believe that well-researched urban environments provide opportunities for fruitful intervention. This report is a means to that end. We commend its utilization by all those committed to the innovation and promotion of appropriate solutions for amelioration of the human settlement adversities facing the urban poor.

Jane Weru
Akiba Mashinani Trust

PREFACE

This report is a culmination of four months of community-based urban planning and design research on Mukuru Kwa Njenga, an informal settlement on the southeastern part of the city of Nairobi. The research was led by the Centre for Urban Research and Innovations (CURI) and its partners, namely, Akiba Mashinani Trust (AMT), Muungano wa Wanavijiji, and Muungano Support Trust (MuST).

The report is about urban planning and sustainable development in the context of urban informal settlements experiencing t. It presents key elements of the settlement profile; these include aspects of historical and evolutionary significance in conceptualizing informal settlements; the possibilities provided by embracing various approaches of delivering housing as well as conserving and promoting sustainable livelihoods for the urban poor; the role of physical, economic, social, and environmental context and site conditions in exploring appropriate sustainable urban development and... housing possibilities for urban poor; situation of land ownership and tenure security; informal hegemonic structures such as those on ownership with a bearing on the production and use of space, hence housing; vulnerability that situates the communities in abject poverty, marginal ecological conditions, infrastructure deficiency, and general deprivation; urban integration that seeks to include the informal settlements in the city-wide urban networks using communication, mobility, exchange, and synergy as the main drivers.

The research was uniquely designed and undertaken. First, and most importantly, it conceptualizes housing as both process and product thus pursuing a holistic approach to the problem. In its approach, the research embraced active participation anchored on various techniques of user input, including workshops, focus group discussions, participatory mapping, and interviews with key informants. The work also benefitted from community assets and sustainable livelihoods approach to problem-solving, which is based on issues that find immediate relevance among the target groups. Innovatively, the research adopted an exploratory approach that is sympathetic and responsive to local realities and context. This paved way to a negotiated approach to production of space as opposed to dominance. The work involved detailed situation analysis and

mapping in various key areas including population and demographics, land and land use, ownership structure, infrastructure, institutional, environmental, and socio-economic aspects. The alternative planning and design models provided in this report are based on negotiated projections and assumptions derived from very current fieldwork undertaken on Mukuru through CURI. The work underscores capacity building and skills transfer as an integral part in order to realize ownership and continuity of solutions. It is our strong conviction that the pursuance and implementation of the propositions of this report, whether partially or totally, shall constitute the milestones in the path to sustainability of slum upgrading and housing delivery for the urban poor as a whole.

Prof. Peter M. Ngau
Centre for Urban Research and Innovations (CURI)
University of Nairobi

EXECUTIVE SUMMARY

This report outlines an ongoing project aimed at understanding the existing social, economic and environmental conditions of Mukuru Kwa Njenga slum that would inform the preparation of a slum upgrading framework through a partnership between Akiba Mashinani Trust (AMT), Muungano Support Trust (MuST) and the University of Nairobi's Centre for Urban Research and Innovation (CURI). The project was initiated in 2012 due to evictions and eviction threats that were being experienced by the slum-dwellers since early 2011. The participatory methodology adopted for the study enabled the team to understand the situation of the settlement and the main problems facing slum dwellers in Mukuru Kwua Njenga, but also the potentialities and strengths. This report presents findings, key outputs and recommendations to address the lack of secure land tenure, high settlement densities accompanied by poor living conditions.

Mukuru Kwa Njenga slum is one of the largest informal settlements in Nairobi that is located within Nairobi's larger industrial zone, about 8km to the southeast of the central business district. Majority of the inhabitants work in the industries receiving low incomes, but also lack security of tenure which leads to lack of long-term stability and investment motivation towards housing improvement and community development. Security of tenure, water and sanitation infrastructures, housing improvement, and livelihoods were identified as the core issues that need urgent attention. It is for this reason that the study was initiated to accomplish a rapid but accurate study of Mukuru kwa Njenga settlement that will facilitate the preparation of a framework for acquiring of security of tenure and settlement upgrading strategy.

Section 1 INTRODUCTION

1.1. Problem statement

Mukuru Kwa Njenga is part of the larger cluster of Mukuru informal settlements situated about 8 km to the south eastern side of Nairobi 's central business district, along the industrial area. It is one of the largest slums in the city. Majority of the people live under poor conditions. Insecurity of tenure drives to constant threat of eviction preventing inhabitants to improve their households and urban environment. Houses are commonly built in unsuitable areas, for instance, over an open drainage lines, under a high voltage power line, in the railway reserve or in flood-prone areas. Majority of them lack running water, sanitation or garbage collection services as there is no formal infrastructure and services provision. Water and electricity are not always available, are informally provided and most of the households' solid waste goes directly into the river or the streets, being a focus of continuous diseases emergency.

The lack of sanitation and drainage, clean drinking water, combined with poor housing conditions and accessibility lead to a host of health issues that cannot be fully addressed by the existing means. However, the settlement has a vibrant economic life and a strong social cohesion that offers an interesting starting point towards an urban transformation.

1.2. Objectives

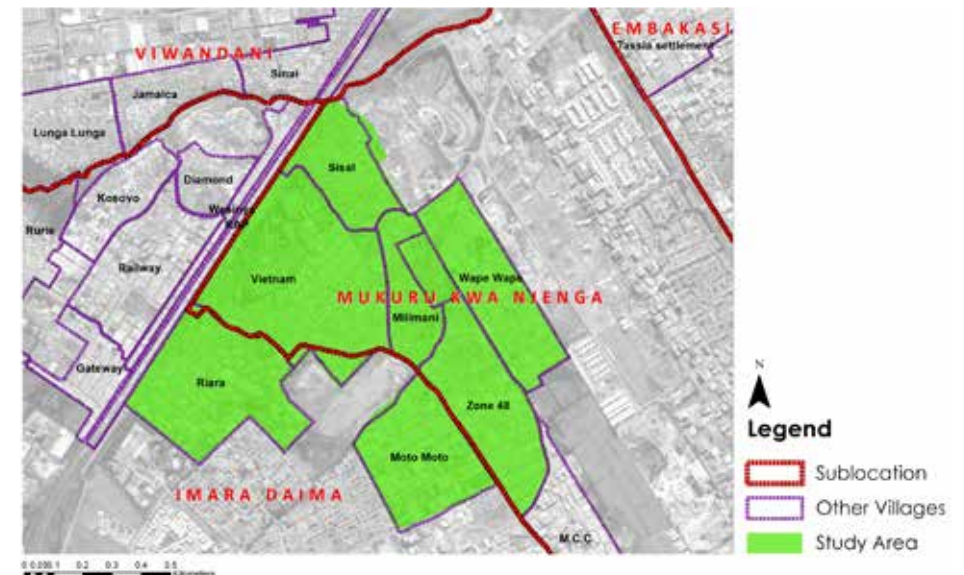
The main objective of this research project is to analyze the current social, economic, physical and environmental situation in Mukuru Kwa Njenga slum in order to formulate a strategy for upgrading of the area, but also the support of upcoming projects on slum upgrading and thus be able to contribute to improved living conditions, hence the alleviation of poverty. The base data compilation will also be a tool of information for Mukuru community that can be used as a starting point for other projects.

The specific purpose of the project is to get accurate figures about the land available for the implementation of the upgrading project as well as the existing population, hence determine how much can be accommodated while achieving appropriate densities. Quality of life in the different villages based on an analysis of the living conditions, expenditure, infrastructures, housing, services and economic activities has been determined in order to set priority areas of action in the upgrading strategy for Mukuru Kwa Njenga informal settlement.

1.3. Location

Mukuru Kwa Njenga Settlement is strategically located, within 20-30 minute drive from the city Centre of Nairobi. Its proximity to the city and to the industrial area gives it numerous advantages. The slum is surrounded by three major roads: Mombasa Road on the Southern Side, Outering Road on the North Eastern side and Airport North Road on the South Eastern side. The settlement spreads over two sub locations, namely Imara Daima Sublocation to the West and Mukuru Kwa Njenga Sublocation to the East [IEBC 2011].

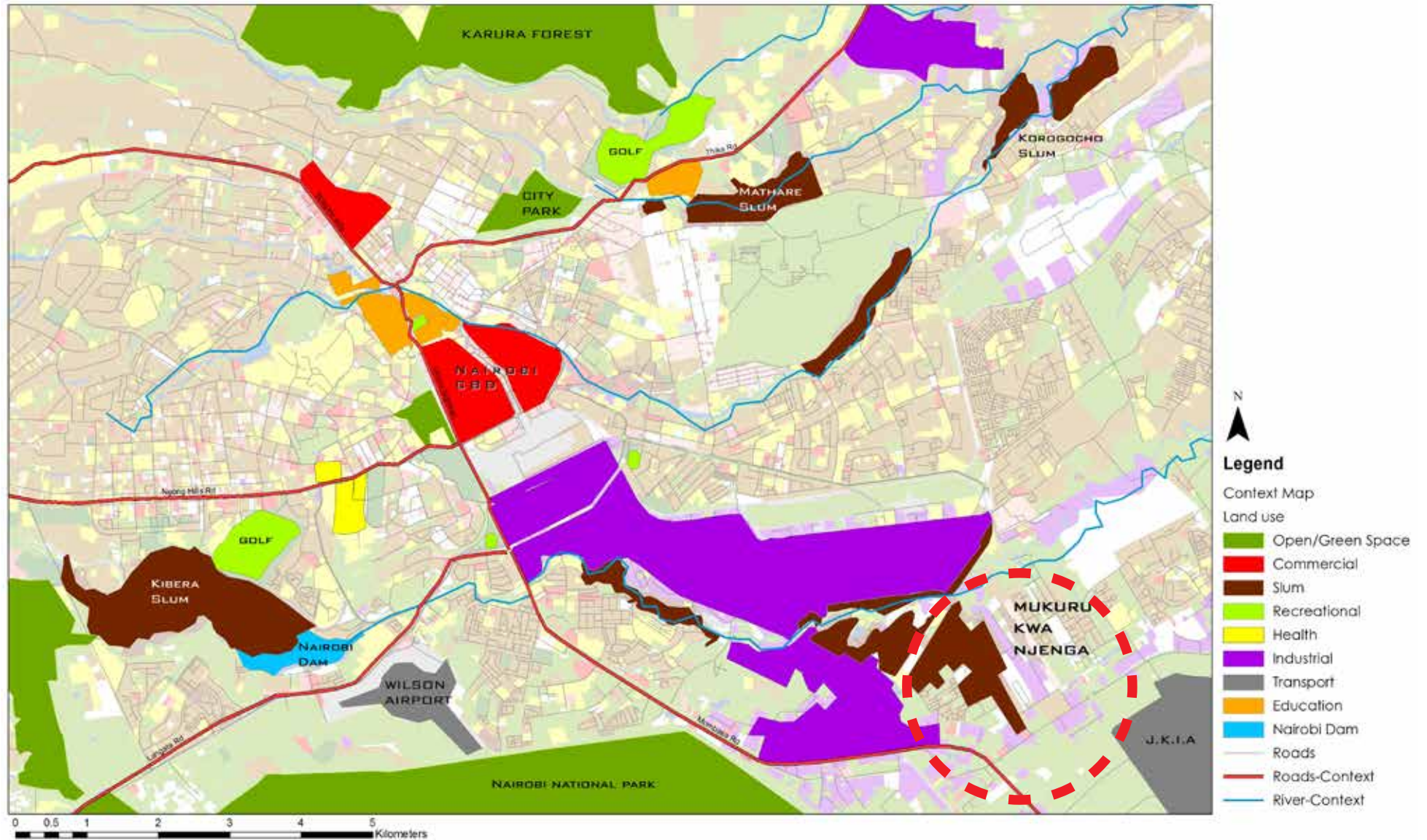
Map 1.3.1. Sub-Location. Source: CURI 2012



Map 1.3.2.

Mukuru Kwa Njenga Location. City of Nairobi

Source: CURI 2012



1.4. History of Mukuru Slum

'Mukuru' means dumping site in Kikuyu. Part of the place was an old quarry where most stones that built the factories were excavated. Huge holes the sizes of manmade dams were exposed which later became death traps to children and laborers working in the neighboring factories, and a breeding ground for mosquitoes during the rainy seasons. The City Council condemned the land as unfit for any permanent construction and converted it to a dumping site for garbage from the city. When the holes were filled with garbage, poor people who were scavenging in the dumpsite started building houses made of wood, cartons and iron sheets. Poverty led to many joining them and a slum finally came to existence named 'Mukuru' or garbage site.

Mukuru Kwa Njenga History

Mukuru Kwa Njenga is one of the slums that make up the larger Mukuru. It began in 1958. The land was then a farm owned by Reuben, (a white settler). The settlement was started by a worker called Munyao after being banished by Reuben from the farm for having stolen some livestock. After Reuben passed on, the Government and other private individuals took over the large farm, leading to the current Mukuru Kwa Njenga and Mukuru Kwa Reuben sections. Later on Munyao was joined by Mzee Njenga (a youth then) and together they started building rental structures (shacks) leading to the informal settlement. In the 80's most of the land around Mukuru was given by government to private developers. Majority of land was not developed, and people migrating from their rural homes looking for job opportunities in the city and an affordable place to stay were informally settled in the private land along the years, near their places of work.

The local administration later came in through the chiefs, who were in charge of allocating people plots at a fee in hand with the chairmen of the area. As the slum grew, the area became harder to control. To solve this problem different villages were created in 2002 as a way of providing security, pointing leaders in each village in order to have control over the affairs in the area. From then, the area was sub divided into eight villages (zones): Sisal, Milimani, Vietnam, Riara, Moto Moto, Wape Wape, Zone 48 and MCC. Most of the inhabitants are immigrants from rural areas looking for job opportunities.

Sisal was the first area built up in 1984, followed by Mimani, Vietnam and the North part of Zone 48 in the next ten years.

These areas, built up as human needs were coming, are characterized by high urban congestion, an organic and unplanned urban layout but also by a more organized population. The other four villages started from a need of expansion of the congested villages from 1998 to 2000. They were planned by the community and are characterized by a more organized urban layout.

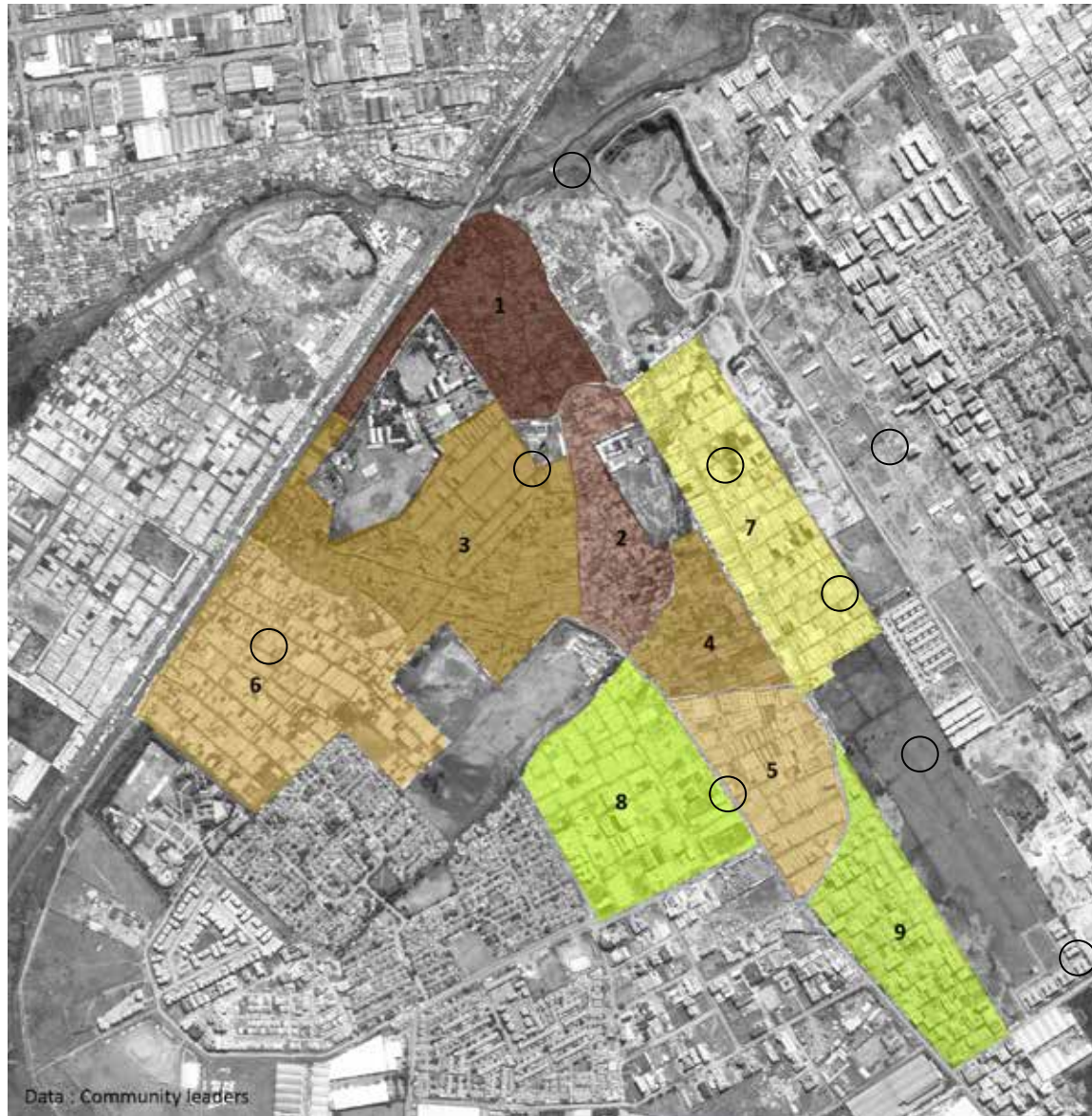
The other four villages started from a need of expansion of the congested villages from 1998 to 2000. They were planned by the community and are characterized by a more organized urban layout. (See Map 1.4.1. next page)



Figure 01. Mzee Njenga, one of the starters of Mukuru Kwa Njenga. ©Z.G.Blanco, CURI 2012

The villages have very different history. Milimani, as its name suggests is located over a soft hill; Vietnam took its name from a massive confrontation between the GSU and the informal settlers in 1996 after an order by the government to demolish the settlement; and Zone 48 owes its name to an agreement of the settlers with the land owner that all 48 Kenyan tribes were represented there. Riara and Wape Wape started in 1998 and 1999 respectively. Part of the parcels in Moto Moto, nowadays Moto Moto A, were originally allocated by Moi Government to individuals capable to develop the area in 1995, and the other part, today Moto Moto B, was irregularly acquired in 2000 by the Moto Moto Group that gave the current name to the village. MCC started in 2000 to build the permanent structures that characterize the area, and it took its name from the Mukuru Community Centre, a local school for street children.

Map 1.4.1.
Mukuru Kwa Njenga Historical Map. Year of creation of the villages
Source: CURI 2012. Information provided by elders, chairladies and chairmen of Mukuru Kwa Njenga



- 1985 ① Sisal
- 1994 ② Milimani
- 1995 ③ Vietnam ④ Zone48 North
- 1998 ⑤ Zone48 South ⑥ Riara
- 1999 ⑦ Wape Wape
- 2000 ⑧ Moto Moto ⑨ MCC

Section 2 METHODOLOGY

2.1. Research Design

The research and upgrading planning process were done in four main phases: Secondary data and literature review, Field data Collection, Situation analysis and upgrading proposal.

Secondary Sources involved the review of relevant documents, publications, videos, request of information from companies and ministries and websites as listed in the bibliography. A desktop research was done on slum upgrading practices in Kenya, Egypt, South Africa, Thailand, India and England, sustainable urban development, sustainable livelihood practices and Mukuru Kwa Njenga available data.

Fieldwork was designed to gather information that was not available from the secondary data sources and also to confirm and compare the information gathered. The exercise was divided into three sectors: Physical and environmental, social, and economic.

Information in the field was gathered through a combination of different means and tools: observation sheets for qualitative data, mapping to locate different facilities, infrastructure and business; interviews regarding social, economic and environmental data; and conversation with key informants with vital information about Mukuru Kwa Njenga.

The fieldwork was carried out by the Centre for Urban Research and Innovation (CURI/ University of Nairobi), and facilitated by MuST (Muungano Suport Trust) through the collaboration of Muungano Wa Wanavijiji and the community of Mukuru. The total number of respondents was 523 adults. Respondents were picked at random. On average, 74 were sampled at random per village.



Figure 02. The various stages of Mukuru Slum Upgrading Project: Fieldwork (up), Situation analysis (down-left) and upgrading and urban planning proposal (down-right). ©Z.G.Blanco, N.Omar. CURI 2012

Situational Analysis. Collected data from the field was analyzed in hand with the secondary data. Qualitative and statistical data and the land suitability analysis were the major results that have stated the bases for the upgrading proposal.

The **upgrading and urban planning proposal** projected different scenarios regarding the situation analysis done and the bases towards an inclusive sustainable urban development. The proposal has been developed in various stages, starting from the land budget, the definition of an upgrading strategy and urban planning approaches, and finishing with the urban planning proposal concerning infrastructures, housing, and management.

Section 3

LITERATURE REVIEW

3.1. Slums and Slum Upgrading

The word slum is used to describe informal settlements within cities that have inadequate housing and squalid, miserable living conditions characterized by lack of secure tenure, poor Housing, low incomes, informal servicing, inadequate social infrastructure, high population densities, heterogeneous population and social cohesion. UN-HABITAT defines a slum household as a group of individuals living under the same roof in an urban area who lack one or more of the following:

1. Durable housing of a permanent nature
2. Sufficient living space (more than 3 people sharing the same room)
3. Easy access to safe water in sufficient amounts at an affordable price.
4. Access to adequate sanitation in the form of a private or public toilet hence sharing by a reasonable number of people
5. Security of tenure resulting in forced eviction

According to United Nations 889 million people in the world were living in slums in 2010. In the developing world, one out of every three people living in cities lives in a slum and two out of three in East Africa¹. Rapid population growth and urbanization, bad governance, poor economic statuses and high contestation over land in a dysfunctional land market are some of the important reasons why slums are developed. Most of these causes are quite hard to control since they get embedded into an imperfect societal system over a period of time. It is for these reasons that different energies from different sources e.g. Governments, Bilateral and Multi-lateral organisations plus communities try to come up with initiatives to either curb the emergence of new slums or improve or eradicate the existing ones. **The process through which slums are gradually improved, formalized and incorporated into the city formal system through consideration of the slum dwellers economic, social and political dynamics is known as slum upgrading .**

3.2. Evictions and Tenure Insecurity

Evictions of individuals, families and/or communities, against their will, from their homes and/or land which they occupy, without the provision of, and access to, appropriate forms of legal or other protection is a very rampant practice in Kenya as reported by Kituo Cha Sheria in 2009. Until recently, with the tabling of the Evictions and Resettlement procedures Bill of 2012, the absence of a regulatory framework in the country has seen the use of obscene methods to inhumanely and forcefully removal of people (National Council for Law Reporting, 2012). In 2009 alone it was reported that approximately 20,000 people had been inhumanly evicted in Nairobi informal settlements within a period of 9 months (Kituo Cha Sheria, 2009).

The Mukuru kwa Njenga project was initiated due to evictions and eviction threats that were being experienced by the slum-dwellers since early last year 2011. A major problem that slum upgrading tries to solve is the lack of secure land tenure faced by almost all slum-dwellers. The lack of such security of land leads to a lack of long-term stability by the inhabitants and thus creates a situation where they are unlikely to invest in their housing or community improvement. It is on this premise that this project aims at accomplishing a rapid but accurate study of Mukuru kwa Njenga settlement and facilitate the community herein with a direction on security of tenure and an upgrading strategy.

3.3. Legislative and Policy Documents Guiding the Project

As more Governments all over the world acknowledge the issue of urbanization and slums, more and more legislative and policy frameworks are being formulated to address the issue. Some of the documents that directed this study include:

- The HABITAT Agenda aims to improve the quality of human settlements, which immensely affects the lives and well-being of people. Elements highlighted are a commitment to adequate shelter for all, enablement and inclusive approach towards sustainable human settlements, gender equality and an international and national cooperation of the various actors .
- The Cities Without Slums Action plan by City Alliance acknowledges that slums are the products of failed policies, bad governance, corruption, inappropriate

regulation, dysfunctional land markets, unresponsive financial systems with a fundamental lack of political will . It aims at creating partnership of all stakeholders so as to make unparalleled improvements in the living conditions of the urban poor.

- The Constitution of Kenya (2010) is the umbrella policy document that directs the laws of the country. Chapter 4 on the Bill of Rights clearly provides for an equal right to life without discrimination and upholds human dignity through even the access to basic needs and chapter 5 on Land and Environment provides for everyone's entitlement to a clean and healthy environment .
- The Kenya Land Policy of 2009 , looks into various land matters ranging from land rights, land acquisition to land tenure security. Two key areas that can be highlighted from the policy in effect to slums is the provision to land acquisition, land ownership, land use and environmental degradation, land conflicts and mechanisms for resolving historical injustices to uneven land distribution with irregular and fraudulent land acquisition .
- Sessional Paper No.3 of 2004 on National Housing Policy for Kenya explains that the government understands the need for quality housing and the important functions of housing. It is for this reason that the Government's long term objective is to move towards a situation where every individual or family lives in decent housing whether publicly or privately developed to meet the necessary needs of security, health and privacy

3.4. Initiatives on Slum Upgrading in Kenya

KENSUP:The Kibera project is a pilot program from slum upgrading across the country by the Kenya Slum Upgrading Program (KENSUP) in conjunction with UN-Habitat. It is steered by a combination of various actors: the Government, local authorities, UN Habitat, NGO's, CSO's and other development partners.

The program aims to improve housing for the slum dwellers through provision of 600 units in high rise. Infrastructure proposed for the area include roads, walkways, storm drainages, water reticulation, street and security lighting infrastructure, sewerage infrastructure, business stalls, bus stops, public toilets and environmental and solid

waste management. The project is run mainly by the government; the cost of construction is not burdened to the community and the government, owner of the buildings, rents the flats to individuals. Currently, individuals of the first phase have moved into the decanting site located across the slum settlement on 2 ha of land (or 4.95 acres). There are complaints of intrusion by middle class members who are not part of the slum having access to the house.



Figure 03. Kibera KENSUP. Soweto A under construction. ©Z.G.Blanco, CURI 2013



Figure 04. Kambi Moto Slum upgrading project. ©Z.G.Blanco, CURI 2013

Section 4 SITUATION ANALYSIS

4.1. Natural Environment and pollution.

The study area is generally flat with gentle slopes in Milimani, Riara, Wapewape and Sisal, at an altitude between 1618 and 1623 m. There is a general smooth slope towards the stream water line that passes through Mukuru Kwa Njenga, a reason why most of the areas around it remain flooded during the rain season.

As the slope analysis shows (see map 4.1.1), Riara stands at the end of a slope, a reason why the east part of the village is affected by floods during the rainy season or even with eventual rains. It has been considered that this problem could be solved by a good drainage system.

As many other slums in Nairobi, Mukuru Kwa Njenga has been developed near one of the main Rivers that crosses the city. Ngong River flows bordering the north of the settlement in Sisal, and it is one of the critically polluted points in the area. The stream that ends in the Ngong River crossing through the slum is now used as an open sewer line that concentrates the untreated waste water from the drainages around and serves as disposal point for some of the public toilets, pit latrines along it, and manual sewage exhausters.

These facts, added to lack of formal collection of the solid waste are contributing to an extremely polluted area and environmental degradation through solid waste dumping anywhere and anyhow. These environmental degradation and pollution have become a common cause of diseases like diarrhea, typhoid, amoebiosis and cholera, as well as the main reason of the pollution of water supplied informally.

The City Council doesn't come to collect waste more than once in two or three months near the railway in Riara. The only community initiative is seen through some youth groups in Villages that deliver plastic bags and later collect the garbage charging a fee of 20Ksh per household.

Village	Organized community members	Dispose on the road outside the House	Dispose in waste pit	Dispose into the river	Burn	Landlord
Riara	10.0%	40.0%	25.0%	-	10.0%	15.0%
Vietnam	45.0%	55.0%	-	-	-	-
Sisal	50.0%	25.0%	20.0%	5.0%	-	-
Milimani	27.3%	36.4%	9.1%	9.1%		18.2%
Wape Wape	5.0%	60.0%	10.0%	-	-	25.0%
Moto Moto	15.0%	35.0%	5.0%	-	5.0%	40.0%
Zone 48	38.9%	33.3%	-	-	5.6%	22.2%
Total	27.1%	41.1%	10.1%	1.6%	3.1%	17.1%

Table 01. Garbage disposal per village. Average of 20 interviews per village. Source: CURI 2012

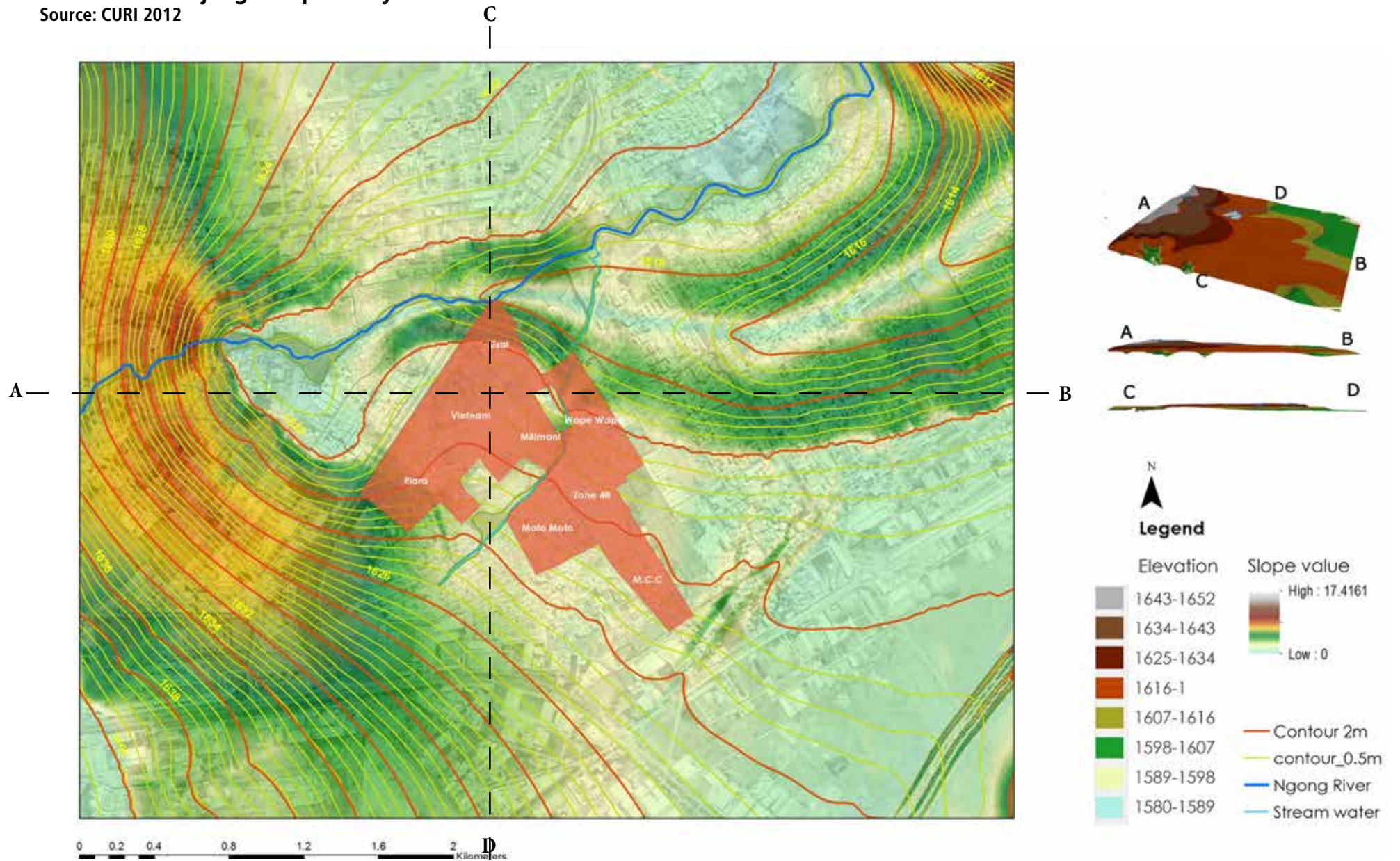
Although the expenses prevent many families to take this service, the interviews done show that the villages with organized solid waste collection are less polluted than the ones with no service.



Map 4.1.1.

Mukuru Kwa Njenga Slope analysis

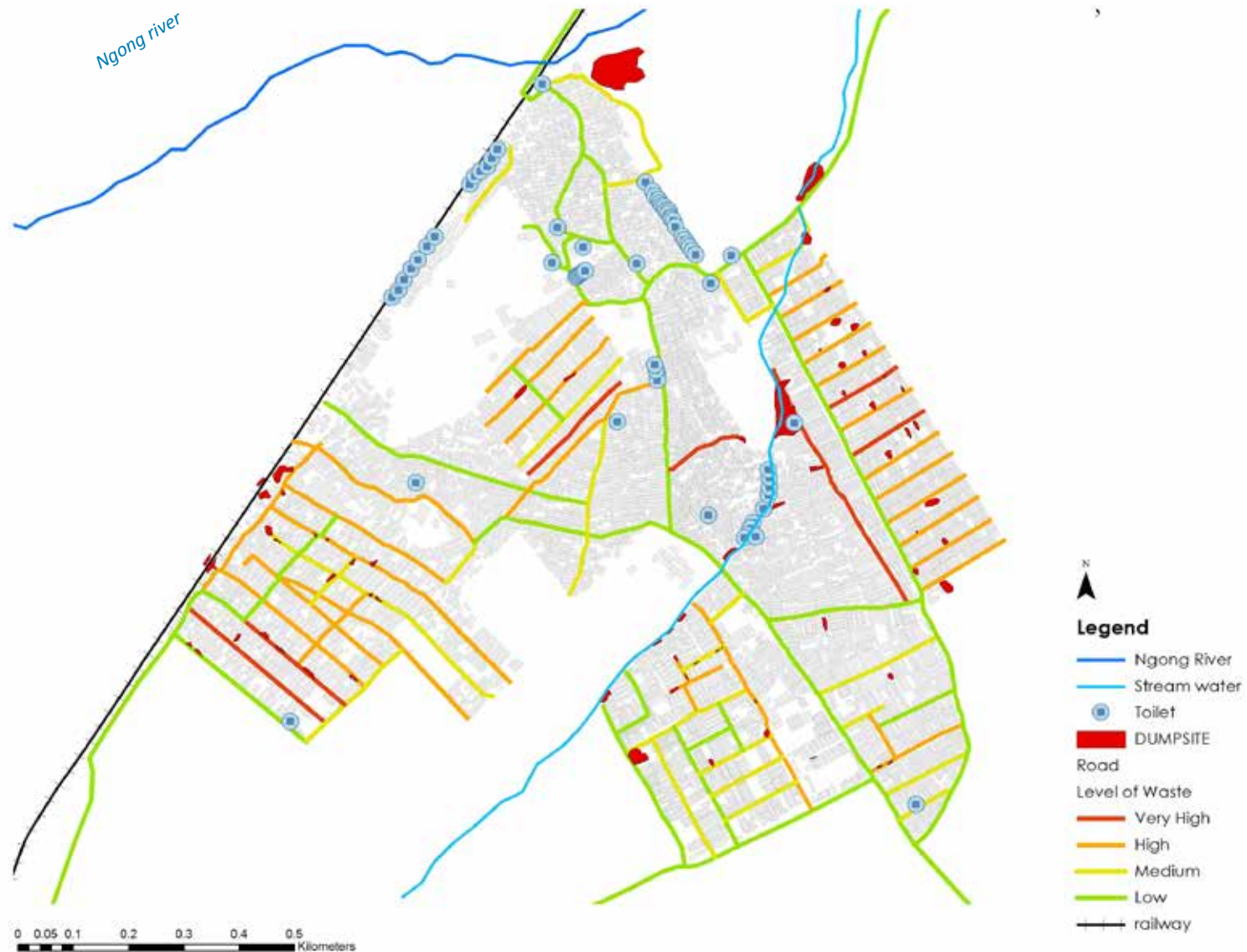
Source: CURI 2012



Map 4.1.2.

Environmental Map. Levels of garbage pollution

Source: CURI 2012



4.2. Population

Just like other many informal settlements there lacked a single recognized population count for Mukuru Kwa Njenga. The 2009 Kenyan Census reported a population of 66,505 in the 7 villages of the study area. However MuST enumeration data presented double that of the census, 130,742 in the same year. A third approach was required to resolve the disparity between the 2009 census that had a likely undercounted and the MuST enumeration that seems to have very high figures. Structures of Mukuru Kwa Njenga were digitized from a 2011 aerial image with the use of laid out parameters (like estimation of percentage of structures used for business, facilities, average area of a household, percentage of space designated to corridors, toilets and overhangs in a structure, average number of persons per household, among others). Population of the seven villages added up to 125,292 (2011), can be estimated to be the same as that of 124,593 in 2009, a number close to MuST enumeration. Though two population estimations point to a higher population than the CENSUS we decided to work with the two main population scenarios: Census and UIP/MuST.



Figure 06. Daily life in Mukuru Kwa Njenga. ©Z.G.Blanco, CURI 2012

VILLAGE	POPULATION			HOUSEHOLDS			AREA (EXCLUDING LARGE FACILITIES km ² // acres)	POPULATION DENSITY (pers km ² // pers acre)		
	CENSUS	UIP	MuST	CENSUS	UIP	MuST		CENSUS	UIP	MuST
SISAL	6791	11427	11900	2490	3809	3955	0.0920 / 22.73	73815 // 299	124203//503	129348 / 523
MILIMANI	4752	8657	9435	1697	2886	3145	0.0622 / 15.37	76399 // 309	139183//563	151688 / 614
VIETNAM	14979	26424	20958	5430	8808	6976	0.2171/ 53.64	68996 //279	121714//493	96536 / 391
RIARA	8551	19655	14616	3172	6552	4872	0.1932 / 47.74	44260 // 179	101736//412	75652 / 306
WAPE WAPE	11631	17465	39708	4665	5822	13236	0.1418 / 35.04	82024 // 332	123164//498	280028 / 756
ZONE 48	10901	19275	16500	3686	6425	3308	0.1507 /37.24	72336 // 293	127900//518	109489 / 455
MOTO MOTO	8900	21690	20625	3195	7230	6875	0.1405 / 34.72	63345 // 256	154379//625	146797 / 594
TOTAL	66505	124593	130742	24335	41531	42367	0.9975 / 246.47	66672 // 270	124905//505	134077/ 538

Table 02. Population from KNBS Census, UIP estimations and MuST enumeration. Source: KNBS, MuST and CURI 2012

4.3. Social and political Structure

Governance and institutional framework

Mukuru Kwa Njenga has two leadership structures:

The Administrative Structure is under the Office of the President represented by the area Chief heading a location. The administrative head of the location is a chief appointed by the Provincial Administration. Mukuru Kwa Njenga is under two sub-locations headed by assistant chiefs and each of the sub-locations is further subdivided into zones or villages. It is expected that this administrative order will undergo restructuring under the new dispensation. The Villages are administered by 3 elders, one chairman and one chairlady per village assisted by a youth leader elected by the community. The elders, in some cases also chairmen, work hand in hand with the chairmen and chairladies of the different villages to ensure smooth running of the day-to-day activities in the Slum. They deal with the problems of the community, ensure the maintenance of plans and internal rules, the management of security and the mobilization and sensitization of the community.

The Chairman is also the unofficial land authority that deals with informal land and structures transfer. Chairmen of all eight zones work together assisting each other and making decisions together.

The Political Structure is part of the legislature comprising of a councilor who leads a ward and a Member of Parliament who heads a constituency. The two are elected by the public at each general election.

Mukuru Kwa Njenga falls under Kwa Njenga Ward and Embakasi Constituency.

Culture and ethnicity

Just like many other slums, the community in Mukuru Kwa Njenga is diverse. The dominant tribes are the Akamba followed by Kisii. However, according to the community leaders and the relation of UIP team with the settlement the community is characterized by a strong social cohesion despite the diverse ethnicity.

Ethnic groups and their activities influence the settlement patterns where by immigrants are attracted to where their ethnic counterparts live. In some cases, ethnic groups influence the design of the structures and the layout within the house hold. For example, the Somalis construct larger rooms 15 feet by 15 feet and not the conventional 10ft by 10ft. Some provide cooking space and an area to hang laundry within the plot which is also used as area for relaxation.

Community Assets

Mukuru Kwa Njenga has numerous community organizations, most of which have been initiated by the people. A larger percentage of the community groups are women groups followed by youth groups, followed by those initiated purely by men. The number of members for groups ranges from below 10 to over 100 members. These groups mainly focus on empowering their members and the surrounding community as well as putting efforts to alleviate poverty. Programs within community groups include mainly savings but also provision of services to the community e.g. community halls, collecting garbage, providing toilets, supplying water, micro loans and sporting activities.



Figure 07. Meeting with the elders, chairmen and chairladies of Mukuru Kwa Njenga. ©Z.G.Blanco, CURI 2012

The saving groups have become an affordable way to start a business, pay the school fees or cater for health care among Mukuru inhabitants. There are between three and four saving groups per village, with exception of Milimani that has just one. These groups are usually linked to the operation of water points, toilets, the bio-centres, the struggle towards the land tenure, and other efforts that try to improve conditions of life in Mukuru.

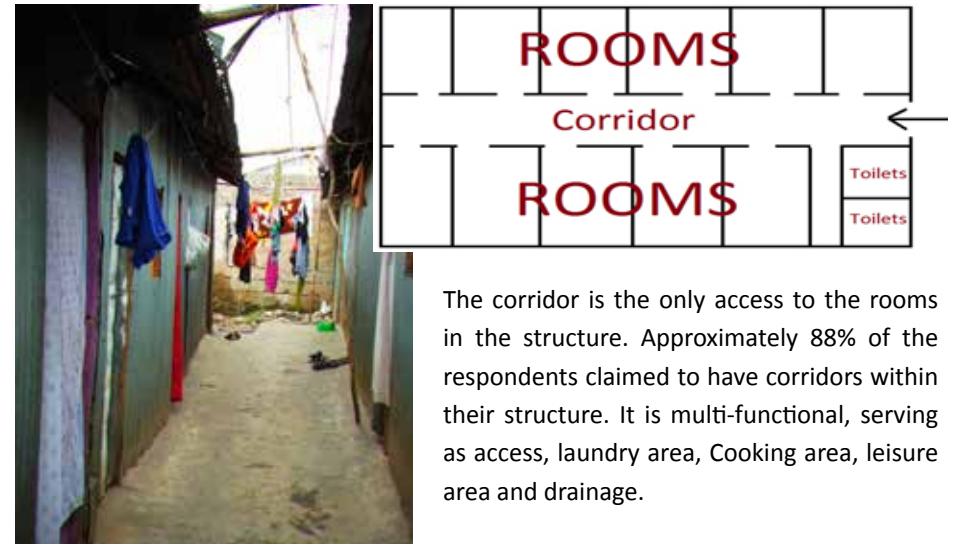
4.4. Housing and Housing Typologies

The most common housing typology in Mukuru kwa Njenga is the low-lying non-permanent structures characterized by iron sheet walls & roofs with concrete floors. In other cases they are made of stone, mud, mesh or wood. The vertical orientation of the iron sheet structures goes up to a maximum of 1 storey so as to avoid structural failure. But the stone structures go up to 4 storeys and are mostly found in Motomoto A. Sisal and Milimani have some of these permanent structures that rise up to 1 floor because the high congestion prevents the horizontal expansion of the villages.



Figure 08. Youth Group in Sisal. ©N.Omar, CURI 2012

Most of the houses are organized into communal living. The typical layout of a structure in Mukuru Kwa Njenga is two rows of 5-12 rooms with a corridor separating the two lines of rooms. Plots in the more planned villages, like Wape Wape, Riara, Moto Moto and part of Vietnam usually have toilets within the structure while others located in congested areas like Sisal, Milimani and Old Zone 48 do not usually have a toilet inside the plot but sometimes in a separate structure.



The corridor is the only access to the rooms in the structure. Approximately 88% of the respondents claimed to have corridors within their structure. It is multi-functional, serving as access, laundry area, Cooking area, leisure area and drainage.

Figure 09-right. Typical floor plan of a structure. © CURI 2012

Figure 10-left. Typical structure corridor. ©B.Onyango, CURI 2012.

Housing Typologies, Building Technologies



Figure 11. One floor Mabati structures.
Riara



Figure 14. Vertical Orientation of buildings.
Sisal. © E.Mwilaria , CURI 2012



Figure 12. Wood structures with thatched
roof. © Z.G.Blanco, CURI 2012



Figure 15. Stone, mud & metallic net tech-
nique. © Z.G.Blanco , CURI2012



Figure 13. Wood structures in Zone 48
© Z.G.Blanco, CURI 2012



Figure 16. High-rise structures in
Motomoto

4.5. Economic activities

The economic activities of Mukuru Kwa Njenga are very diverse and vibrant. Most of the people are either employed in the industrial area or run their own businesses. Most of these businesses are small and form part of the Mukuru micro-economy.

From the 138 surveys carried out at least 80% of the people interviewed work within Mukuru Kwa Njenga whereas 21% work outside the settlement.

Motorable streets are the main economic corridors of the area due to the good accessibility and conditions in comparison with other streets of the settlement. The major economic site is located on Wape Wape's main street, where around 85% of the front part of the permanent structures are business or business combined with residential forming the main economic spine. Another economic site is located along the Railway line in Sisal, where many business activities are taking place just around the Ngong River Bridge.

The open spaces are used as recreational, and no businesses are taking place despite their big sized, due to the difficult access to these areas. The predominant types of business along the roads and secondary streets in Mukuru include grocery/vegetable vendors, bars/restaurants and hotels, charcoal vendors, tailors, barbershops and salons, kiosks and shops.

In regards to the average amount made from business in Mukuru in a day, 18.6% of the 129 people interviewed make between 151-300 Kenya Shillings in a day, making it the most common scape. Few people earn above 5000 Kenya shillings whereas almost 10% of the business people interviewed earn below 150 Kenya Shillings in a day.

Just almost 50% of the people interviewed were able to sustain themselves from the businesses they run. However, more than half of the people running businesses are satisfied with the businesses they are carrying out. The ones not satisfied represent almost 30% of the respondents due to the challenges they have to face day by day like high competition with numerous similar businesses, power blackouts or the high number of debtors. Other important challenges businesses face are related to the

threat of eviction (spatially in Wape Wape), the affordability of commodities and rent as well as the insecurity in some areas. Despite all the challenges, majority of the business folks are hopeful in maintaining and expanding their businesses.

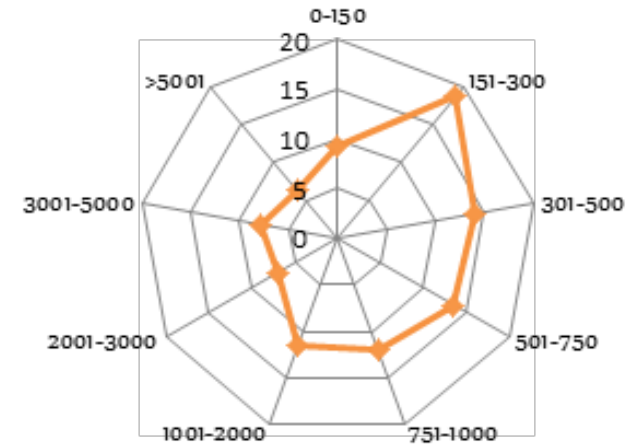


Chart 1. Gross amount made per day as per respondents. Source CURI 2012

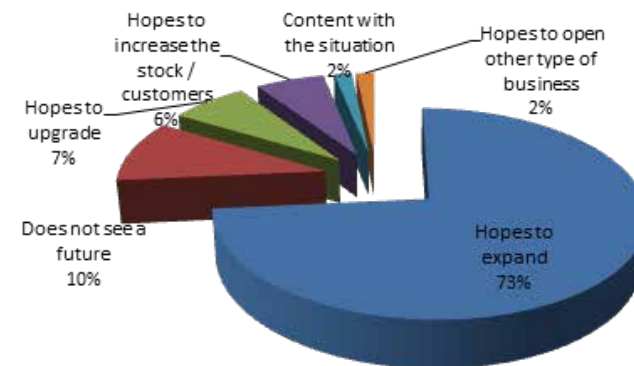


Chart 2. Future business opportunities perception as per respondents. Source CURI 2012

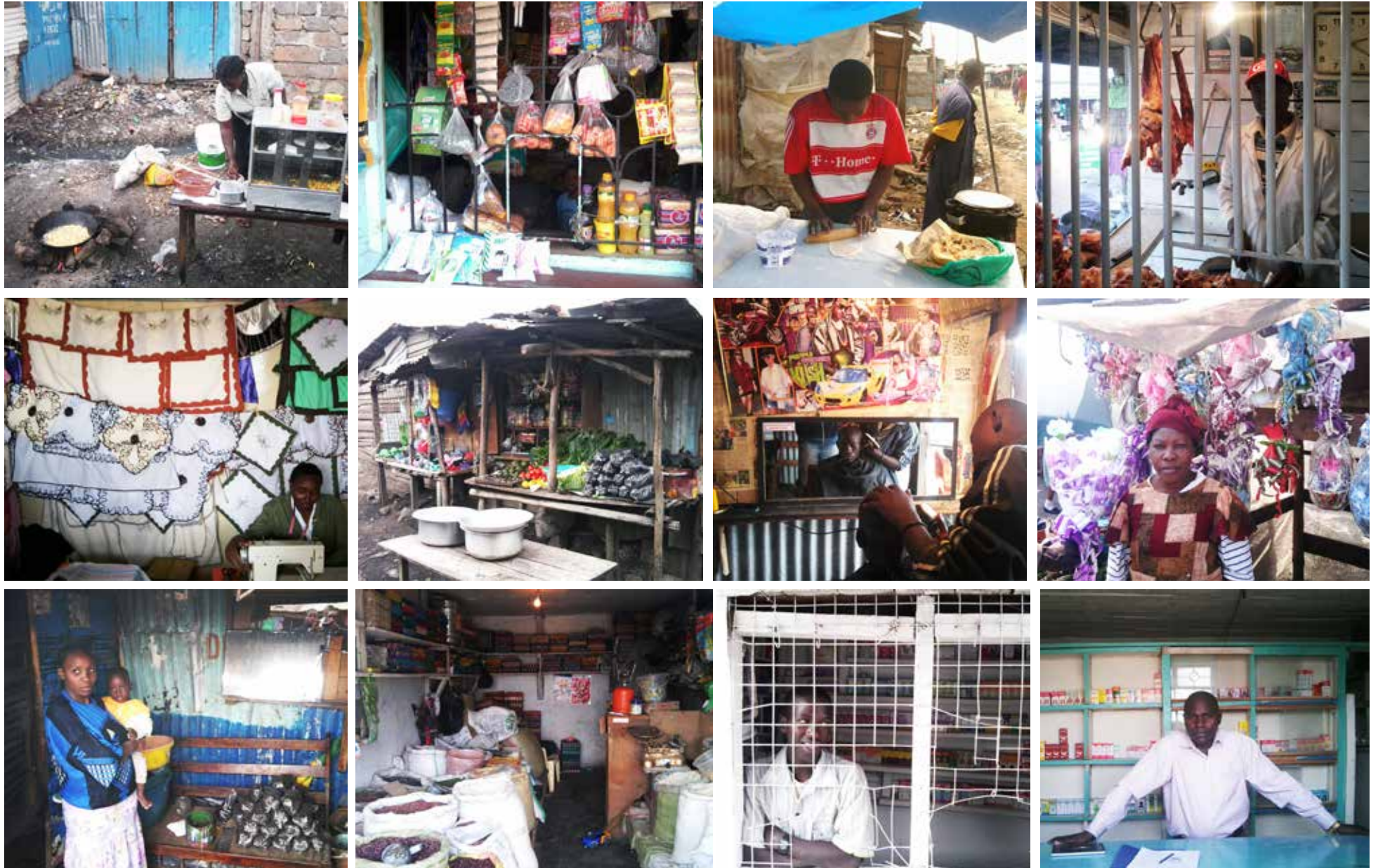


Figure 17. Business typologies in Mukuru Kwa Njenga. (left- right, up-down) Fries vendor, kiosk, chapaty vendor, butchery, Tailor, green grocery, hair dresser, flowers vendor, charcoal vendor, vegetables shop, pharmacy kiosk, Pharmacy shop, © B.Onyango, CURI 2012.

4.6. Roads and circulation

Walking is the major mode of movement used in Mukuru Kwa Njenga, and few people also uses bicycle as a cheap mode of transport. There is a motorcycle terminus near the AL-Hudaa Mosque (Sisal Mosque) whereby the motorcycles are used occasionally. The residents also access bus terminals for movement outside the slum.

The main entry/exit points are through Mombasa road and North Airport road from the South (MCC and Moto Moto), and Outering road from the North (Sisal). The residents also use small informal footpaths along and across the railway to access the Industrial Area for work. The flow rate in the Major and minor spines varies with the condition of the road. The poor road networks are non-motorable and they have a low flow rate due to accessibility problems mostly caused by solid waste and mud. The barriers to permeability within the study area are the walls separating the middle income area, i.e Imara Daima from Riara and Moto Moto; the functional quarry; Green fields; and Transami yard in the east bordering Sisal, Wape Wape and Zone 48; and the railway in the North West bordering Sisal, Vietnam and Riara

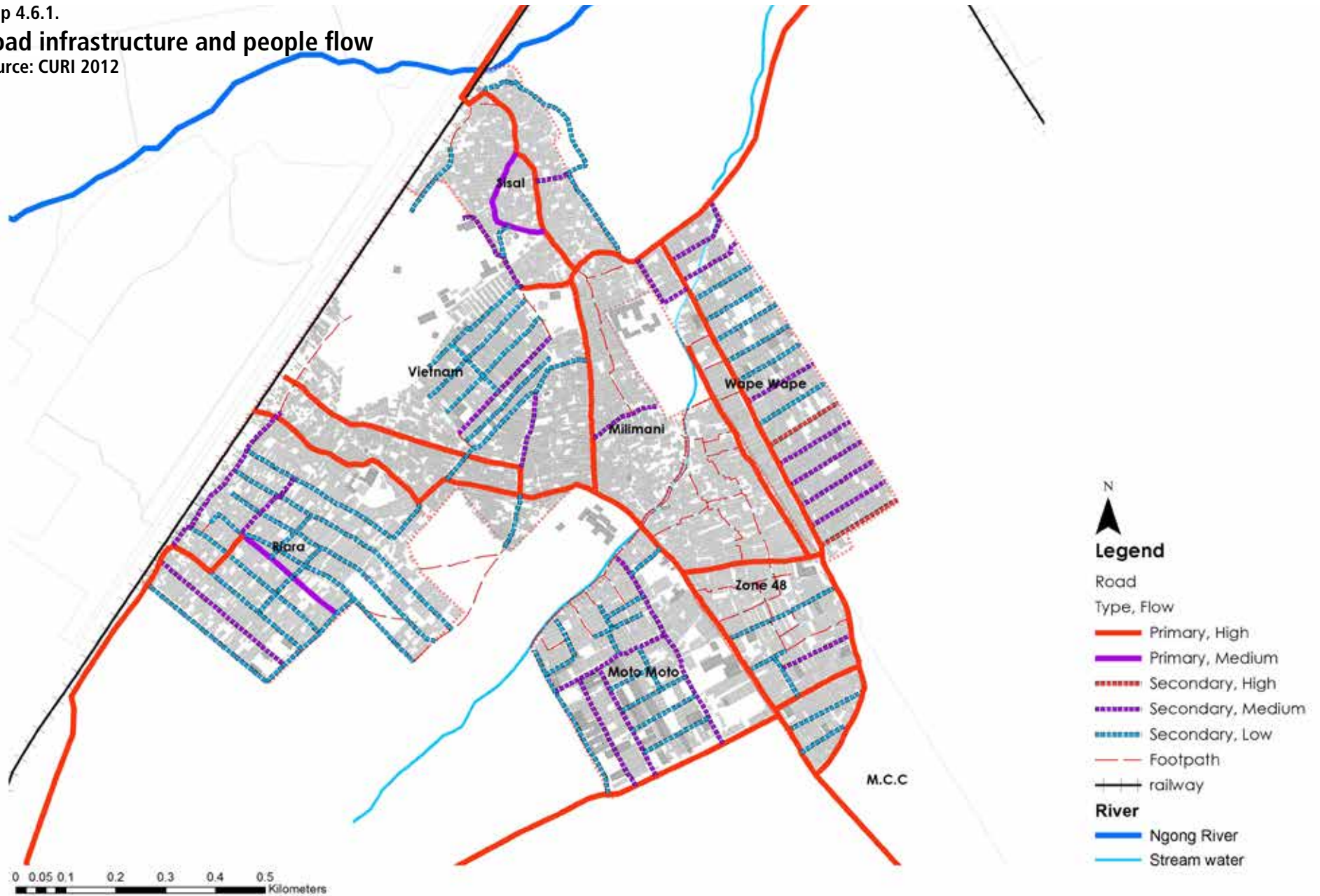


Figure 18. Wall separating Riara village from Imara Daima Estate. Barrier. ©Z.G.Blanco CURU 2012

Map 4.6.1.

Road infrastructure and people flow

Source: CURI 2012



4.7. Water and sanitary infrastructure

Water in the area is sourced from three points: Imara Daima, the Cereal Board area (through Sinai) and Emba-Villa. NAWASCO is currently providing proper water pipes in the main streets, but still not working. Just a few water points in the south part of Moto Moto are already in function.

The company pipes the water up to two major points: Riara and Motomoto. The legality of the supply is still under wraps, thus it can be said that water supply is a service provided between the formality and the informality. From these two points, commonly referred by the residents as “chambers”, water is supplied to the other villages with the exception of some parts of Sisal (i.e. the Northern part) which gets the water from the Cereals Board area. The fee paid per jerican to NAWASCO is 3ksh (20 liters of water), and the price they normally sell it to the people is 5Ksh for the 20-litre jerican. So we can conclude that slum dwellers are paying 66% more for water than the formal provision.

The Emba –Villa and Sinai water sources are got through more clear illegal methods. Water is tapped from the main water pipe and it supplies part of Motomoto and Sisal respectively (see figure 20).



Figure 19(left) Chamber with meters in Riara. Figure 20. (right) Water illegally tapped in Emba-villa.



Figure 21(left) Polluted Water point In Vietnam. Figure 22(right) Water pipes passing through the open sewage line in Moto Moto. ©Z.G.Blanco, CURI 2012

Water is usually consumed from water points and water kiosks that are distributed throughout the villages. The water points are owned by individuals whereas the water kiosks are owned by groups. Water points are mainly located outside the plots, with just 3% being inside the permanent structures.

Most residents complain of inadequate water availability and bad quality of water supply. The service informally provided accompanied by the high pollution affects to the quality of water. It is common to see water pipes passing through open sewage lines or under the solid waste in the streets.

Regarding water consumption, according to the 138 individuals interviewed with an average of 3 occupants per household, the average consumption of water per day per person in Mukuru Kwa Njenga is 29 liters, much over the minimum recommended (15 liters per day per person).

Map 4.7.1.

Water points and water informal infrastructure

Source: CURI 2012

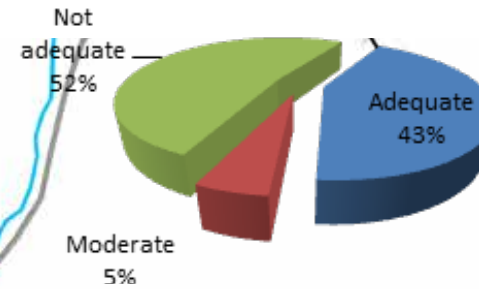
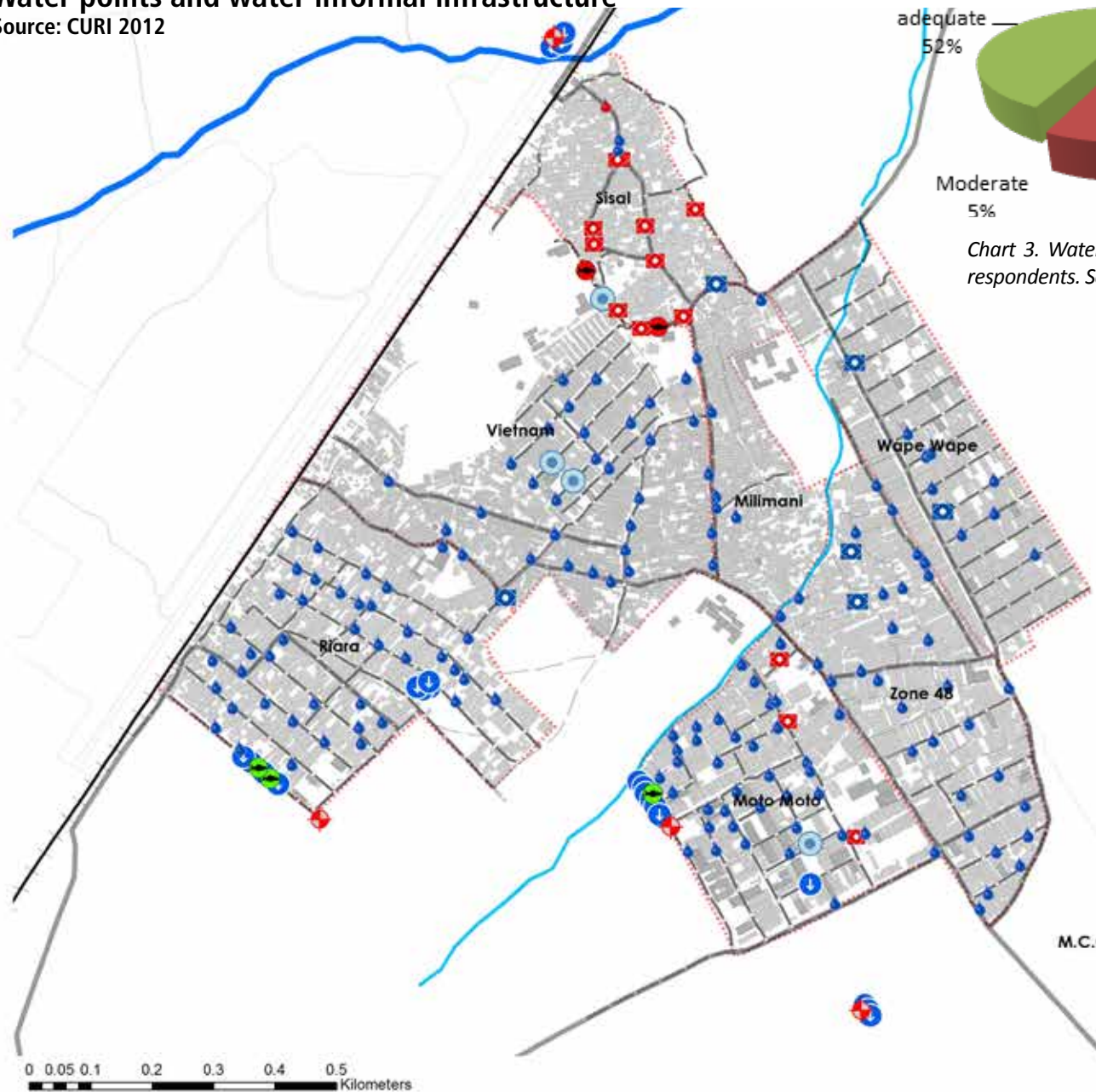


Chart 3. Water availability as per respondents. Source CURI 2012

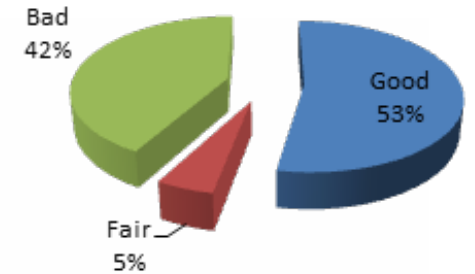


Chart 4. Water Quality as per respondents. Source CURI 2012



Legend

-  Water Connection point
- Water Point**
- TYPE, Condition**
-  Standpoint, Not Working
-  Standpoint, Working
-  Water Kiosk, Not Working
-  Water Kiosk, Working
-  Borehole, Working
- Water Meters**
- Condition**
-  Not working
-  Working
-  Water Pump

4.8. Human Waste Management

The pit latrines are the dominant types of toilets with a few bio-latrines/bio-centers: one in Sisal, two in Vietnam and one in Milimani that currently is not working. Motomoto village has several flush toilets due to the more permanent stone house typologies. Most of the private pit latrines are located within the residential plots in regards to the building policies set by the elders except in the more congested areas, where the toilets usually are located under the power, riparian or railway reserves and in the areas affected by floods.

The human waste disposal method commonly used is the manual exhauster (also known as Ambulance). The people that provide this service have organized themselves into a group.

Normally, it costs Ksh.300 to empty one drum, and depending on distance from the disposal site, it can go as high as Ksh.600. The manual exhausters are emptied directly into the stream water near Greenfields in Sisal, thereby posing more pollution problems.

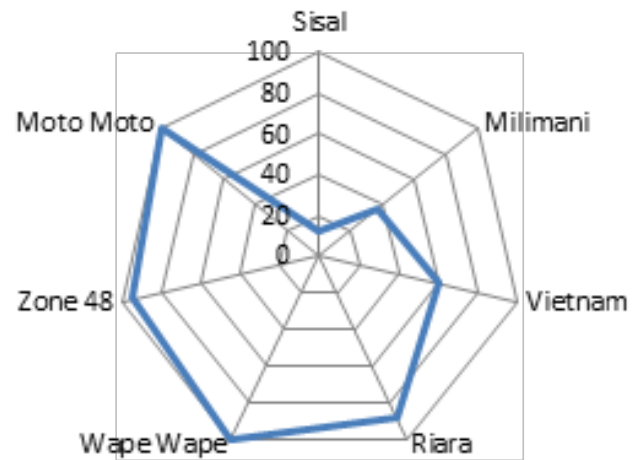


Chart 5. Proximity of toilets according to villages as per respondents.
Source: CURI 2012

In the more accessible parts of Motomoto and south of Zone 48, the mechanical exhauster services are used due to the good accessibility and soon, permanent structures will be connected to the sewers under construction.



Figure 23. (up left) A row of toilets along near the railway and under high transmission electricity lines. Figure 24. (top right) Choo initiative for small spaces. Figure 25. (bottom) Embakasi Girls ambulance parking and men pushing the manual exhauster through a muddy road in Riara. © E.Mwilaria, CURI 2012

Map 4.8.1.
Sanitation (Toilets)
 Source: CURI 2012

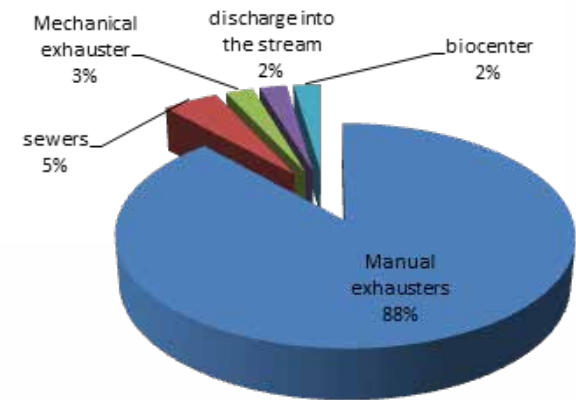
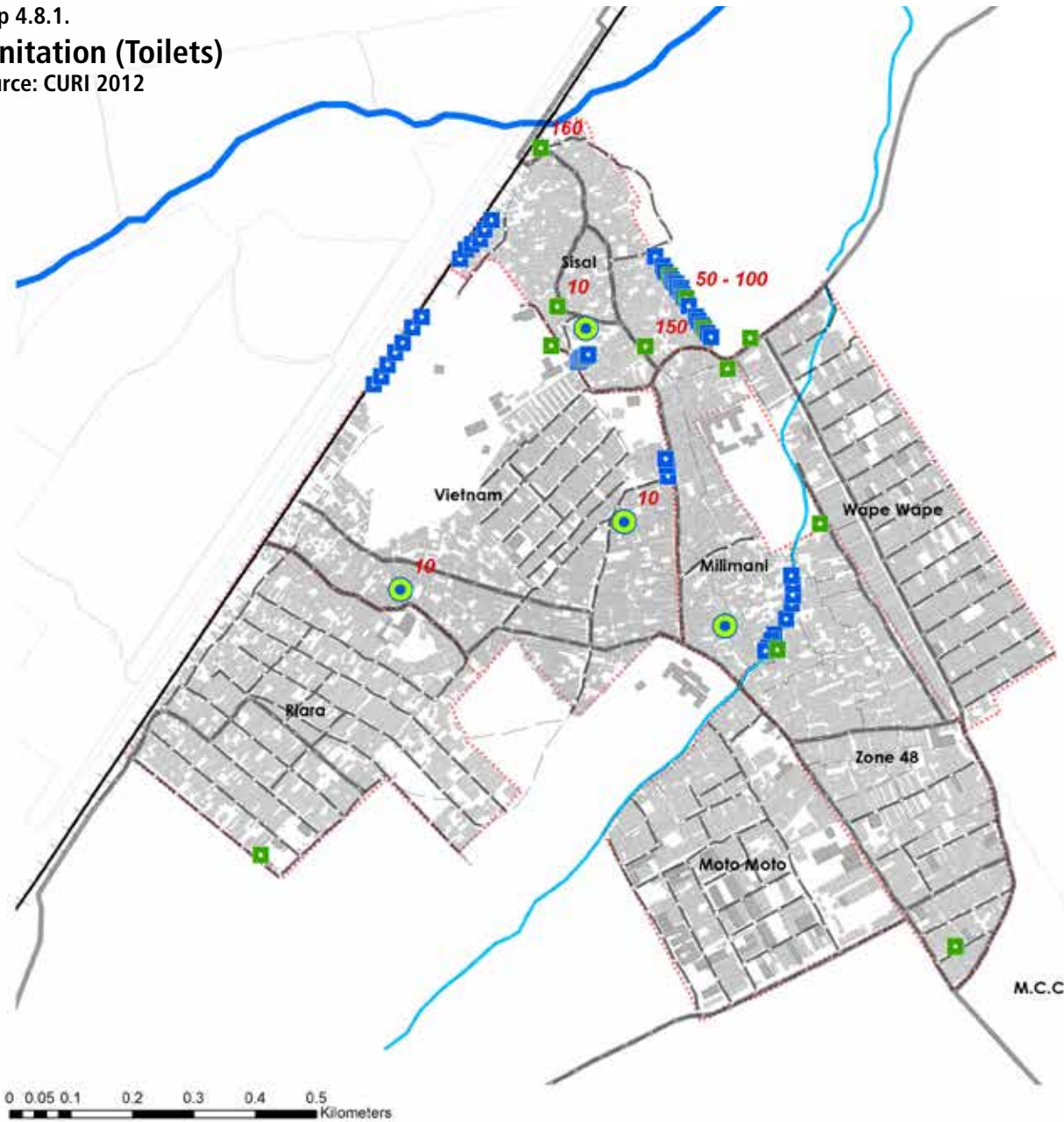


Chart 6. Means of human waste collection as per respondents
 Source: CURI 2012



Legend

Toilet

Type, Ownership

Bio-Centre, Communal

Pit Latrine, Communal

Pit Latrine, Individual

Road

Footpath

railway

Ngong River

Stream water

4.9. Solid Waste Management

There are no legally designated dumping sites within the study area, so traces of heaped up waste are visible everywhere. In the more organized methods, youth groups collect and dispose solid wastes at various specific locations within each village. A minimum monthly fee of ksh 20 is charged for the garbage collection carried out by the youth groups. In other cases the landlord handles the solid waste for his/her plot. Some landlords charge the tenants for this service while others do it for free.

In the non-organized methods, residents just throw their waste outside the plot onto the roads or gather the waste and burn it. In rare cases some dispose at the waste pits. The haphazard disposal methods contribute to clogged drainage systems and foul smells, being the main catalysts for diseases like cholera and typhoid. The City Council of Nairobi does not collect the waste in the area with exception of Riara near the railway, where they collect once in two or three months. There are families and waste pickers that sort the main waste that can be sold to the recycling enterprises or just reuse it.

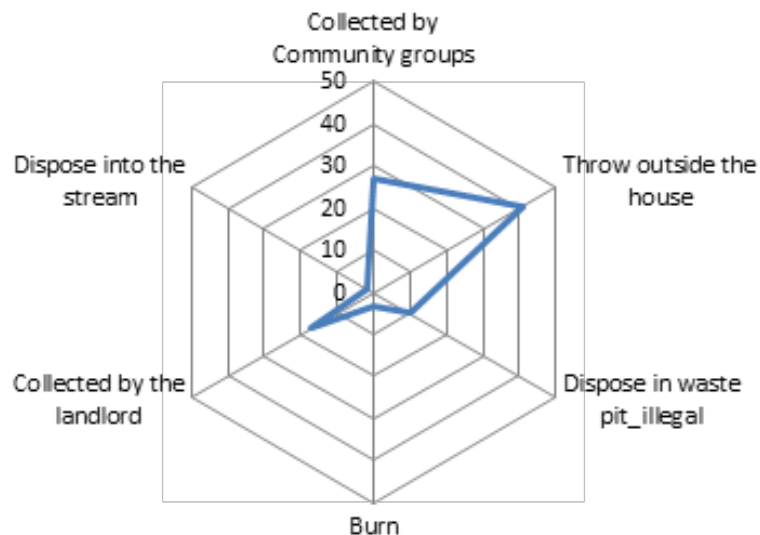


Chart 7. Means garbage disposal as per respondents. Source: CURI 2012

4.10. Sewerage

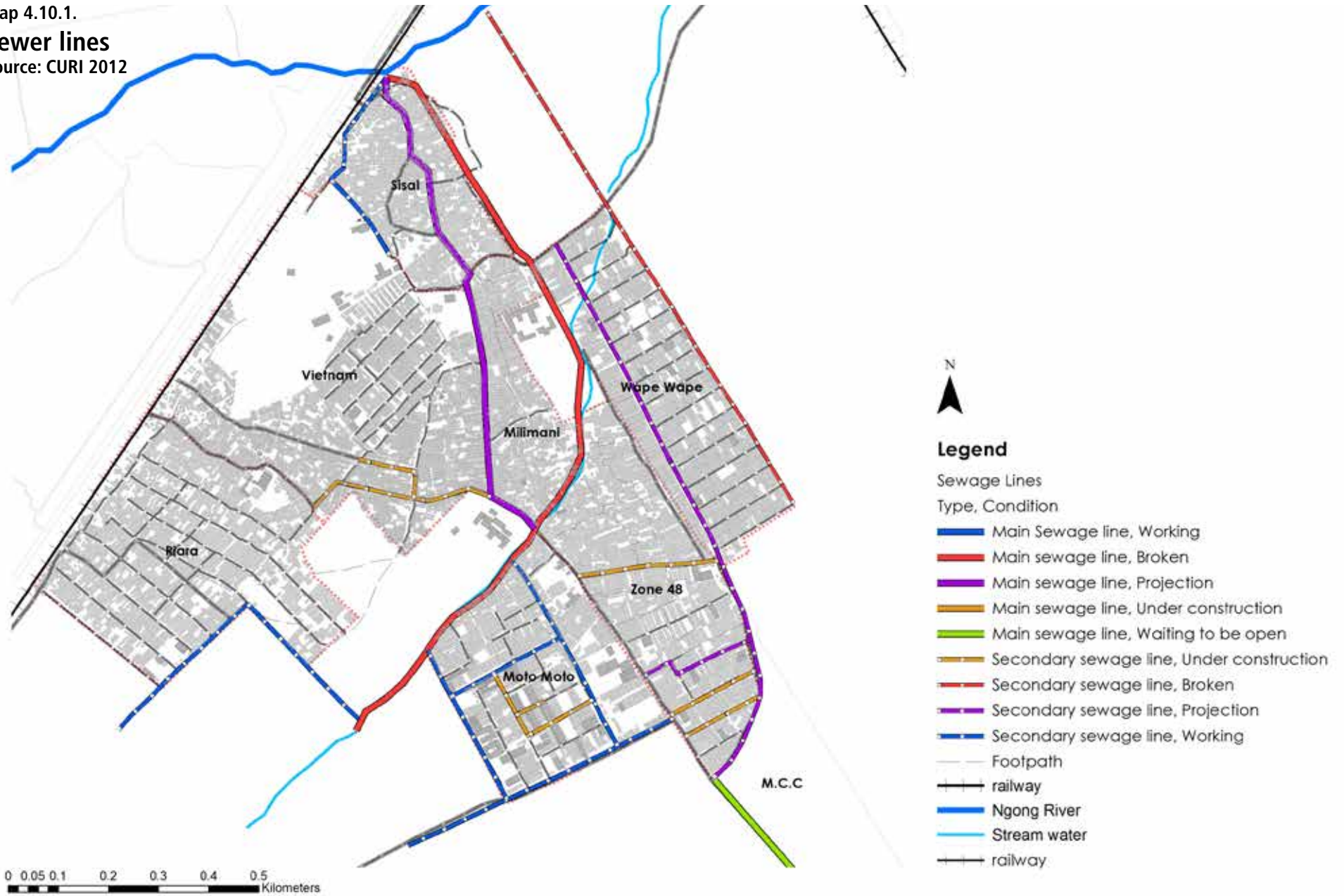
The sanitation in Mukuru Kwa Njenga is already under construction by NAWASCO. The only sewer lines functional so far are in Moto Moto and connecting Our Lady of Nazareth to the main sewer line near Ngong River in Sisal. In the past there were two main sewer lines crossing the settlement that collapsed ten years ago which is the reason why the stream is nowadays an open sewer.

There is little evidence of formal drainage system in Mukuru Kwa Njenga. In the main streets that cross the settlement the drainage is covered with wood sticks and in some cases it is made of concrete. But in most of the area the residents have taken initiative to dig up trenches to serve the purpose, creating streams of open drains many of which have collapsed due to accumulation of waste. These drains empty into the open sewerage systems in use, the stream water.



Figure 26(left): stream and open sewage in its way between Milimani and Zone 48. Figure 27(right) open drainage collapsed. ©Z.G.Blanco, CURI 2012

Map 4.10.1.
Sewer lines
 Source: CURI 2012



4.11. Energy: electricity and cooking fuel

There are two main power lines in the settlement. A 220Kw high voltage line along the railway and a 66Kw voltage line bordering the east part of Sisal and crossing Zone 48. Under both of them, despite having a reserve of 30 and 15 meters way leave respectively, people have settled. There are no known methods of clean energy to provide electricity that residents have ventured into. There are only three floodlights in the whole area, and small streetlights in the road border of Moto Moto with AA zone.

More than $\frac{3}{4}$ of the respondents in Mukuru Kwa Njenga have access to electricity (See chart 8). The most prevalent method used to acquire and distribute electricity is the “Sambaza” informal method, whereby residents tap electricity directly from the electricity service lines. A few of the residents use direct connection from Kenya Power grid and this is mostly in Moto Moto A. The sambaza method is very dangerous and has caused accidents like electrical fires or electrocution over the years. The monthly expenditure on electricity is between Ksh.250 and Ksh.380 per month, with a crossing average of approximately Ksh.300 for Mukuru Kwa Njenga.

In regards to the cooking fuel that is used, about 90% of the respondents in the 7 villages rely on charcoal and kerosene for cooking. Expenditure on cooking fuel per day ranges from Kshs. 10 to Ksh.150. This cost depends on whether the cooking is done at the household level or for a commercial function. Majority of households interviewed spend 1,500 Kenya Shillings per month on cooking fuel.

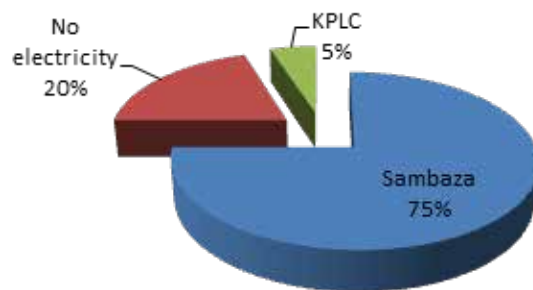


Chart 8. Method of distribution of electricity as per respondents. Source: CURI 2012

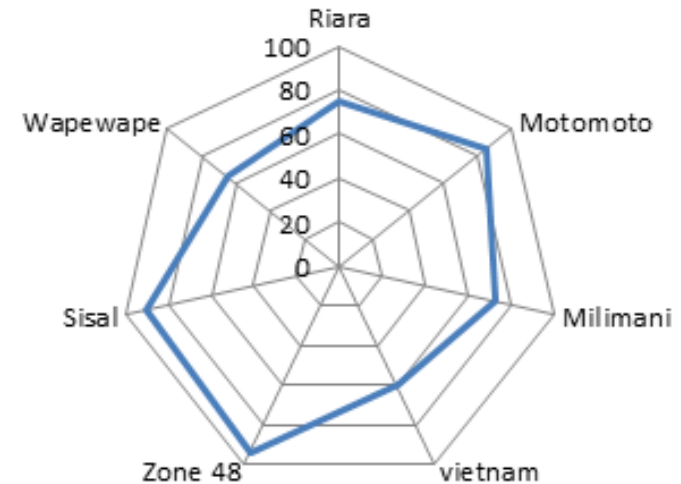
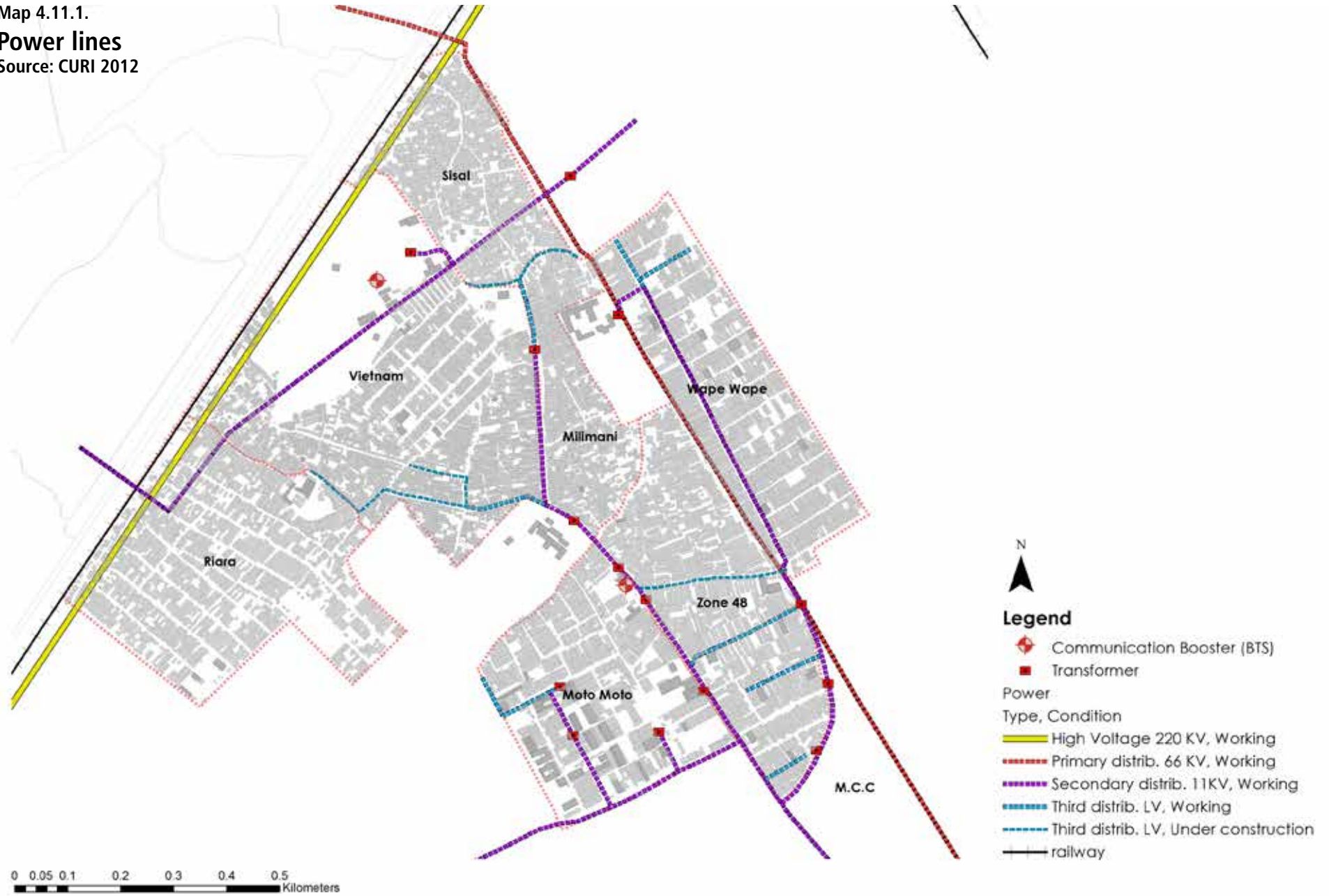


Chart 9. % of Households with electricity in villages as per respondents. Source: CURI 2012



Figure 28: High voltage line over the households in Sisal. ©Z.G.Blanco, CURI 2012

Map 4.11.1.
Power lines
 Source: CURI 2012



4.12. Household expenditure

On average, the amount of money a household spends on a monthly basis ranges from Kshs. 5,000 to Kshs. 7,200 that covers basic needs such as food, clothing, water, and electricity but also other petty expenses. In regards to expenditure on rent, Mukuru slum residents spend monthly average of 1500 Kenya shillings. The rents are cheaper in the less accessible and poorer conditions areas, areas affected by floods or insecurity, case examples being Sisal near the railway and Old 48 near the stream. Rents in well located plots near the motorable streets are the most expensive and developments usually combine business with household use.

Item	Monthly expenditure (Ksh)
Rent	1500
Water	650
Electricity	300
Food/clothes	3550
Cooking fuel	1500
TOTAL average	7500

Table 04. Household average expenditure per month in rent and services.

Source: CURI 2012



Figure 29: Day to day in Mukuru Kwa Njenga. ©Z.G.Blanco, CURI 2012

4.13. Community facilities

Most of the social services in Mukuru Kwa Njenga, such as education and health, are provided informally through private individuals and organizations mainly due to the lack of the involvement of the government in providing services to informal settlements. Other reasons that lead to the prevalence of informal facilities include poor economic status, lack of tenure security, and lack of space for providing facilities and services in the area.

For facilities which claim ownership of the land, the structures are made of more permanent material such as brick. The presence of social facilities assists the community in negotiating for land and fighting eviction threats.

Education

Mukuru Kwa Njenga has numerous primary schools with just two secondary schools in the settlement. There is a mixture of formal and non-formal schools but most of them are non-formal and privately owned. The three formal schools in the area include Our Lady of Nazareth, Kwa Njenga Primary School and Embakasi Girls, with schools fees ranging around KSh. 500 per month.



There is an average of 10 informal schools per village. Pupils in the school range from 20 to over 300 pupils with the exception of Kwa Njenga Primary School which has over 1,000 pupils.

There are over 70 private, non-formal education facilities in Mukuru Kwa Njenga. These are more of income generating activities; therefore education provision is a business within the settlement. Over 85% of the facilities are located on rented spaces that were initially residential rooms. Actually, the combination of education-residential use is quite common. School Fees range in informal schools are around KSh. 300.

Health

The settlement has both formal and informal health services. The two main formal facilities within the settlement include Medical Missionary of Mary Church and Alice Nursing home. The other facilities in the area are mainly informal chemists and mini-clinics.

The major diseases in the area are sanitary related and respiratory diseases. The inhabitants of the settlement are prone to sanitary related diseases such as diarrhea, amoebiasis, typhoid and malaria, due to poor drainage and waste disposal in the settlement. Respiratory diseases such as TB, asthma, pneumonia may be due to lack of proper ventilation within the structures and the location of a quarry nearby. According to health officials in the area there is an increase in the disease during the rainy season. STDs and STIs are also widespread in the area.

Religious

The two dominant religions in the area are Christianity and Islam inevitably making churches and mosques to be the predominant religious facilities found in the area. Religious facilities double up as areas of worship and venues for meeting, especially the large facilities.

Social and Community Halls

There is a shortage of social and community halls in Mukuru Kwa Njenga. Most of the functions and meetings in the area are held in open spaces, churches, people's homes and on the streets. The few social premises in the area have been constructed by youth groups as income generating activities e.g. Amusha Youth Bio Centre.

Open spaces

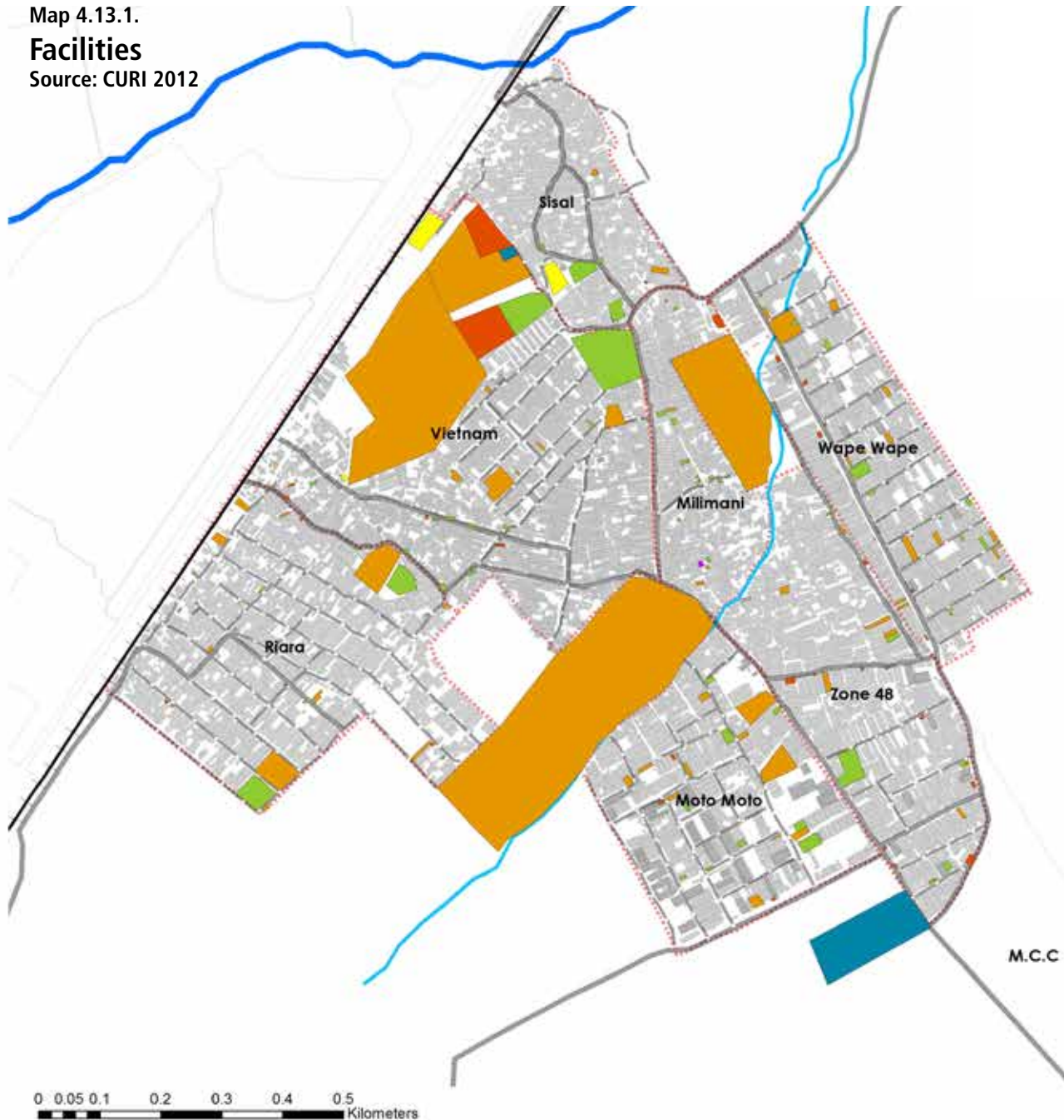
Most open spaces in the settlement are associated with social facilities, mainly education. The choice of their use is dependent on proximity and size but also on the type of activity i.e. activities such as sports games require large open spaces unlike children play.

Streets serve as multi-functional open spaces. They serve physical, social, and economic roles. They are used as playing areas, meeting spaces, areas of worship, training ground for various activities, etc. When open spaces are not used regularly, solid waste is deposited on them, thus turning them into dumpsites.



Figure 31. Children Playing on the Pipeline field. ©N.Omar, CURI 2012

Map 4.13.1.
Facilities
 Source: CURI 2012



Landmarks

Landmarks are areas that members of the community highly recognize, value, and use as physical reference points. The landmarks are mainly in the form of the main facilities of education and health, the bio-centers, the main churches and mosques, the Wape Wape market and supermarket, the water chambers, open spaces such as Vision or Pipeline, and the home of Mzee Njenga, one of the founders of the settlement

These sites can be used in the planning process as places of reference, places to conserve so as to maintain the identity of the area.



Security

State of Security can generally be classified as relatively fair, according to the respondents in the survey. The percentage of respondents claiming good security and insecurity is almost equal: 40% claiming insecurity and 35% stating that the security is relatively good. The remaining 20% ranked it as average. However, security of the area varies per village as showcased in chart 10. Motomoto and Wapewape have relatively good perception of security whereas Milimani is considered to be the most insecure zone followed by Riara.

Management of Security

Security in Kwa Njenga is managed both formally and informally. The formal security is mainly provided by means designated by the local authorities, like the police post in Sisal and the one located in AA; the local administration (The Chairman, Chairlady and Youth Leader act as security advisors and administrators in the area); and the Installation of Lighting Masts. The informal security means that it has been taken up by the community. This includes the community policing done by the youth, the establishment of settlements to avoid bare areas, watchguards for some plots and businesses, and gating of plots. During the 2007/2008 Post election violence, it was the youth of the whole of Mukuru Kwa Njenga who protected the area from attacks.

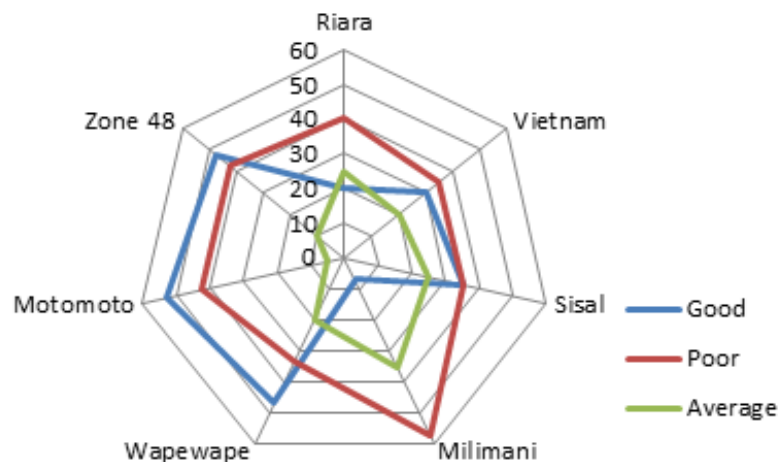


Chart 10. Perception of security within villages as per respondents. Source. CURI 2012

4.14. Land use and ownership system

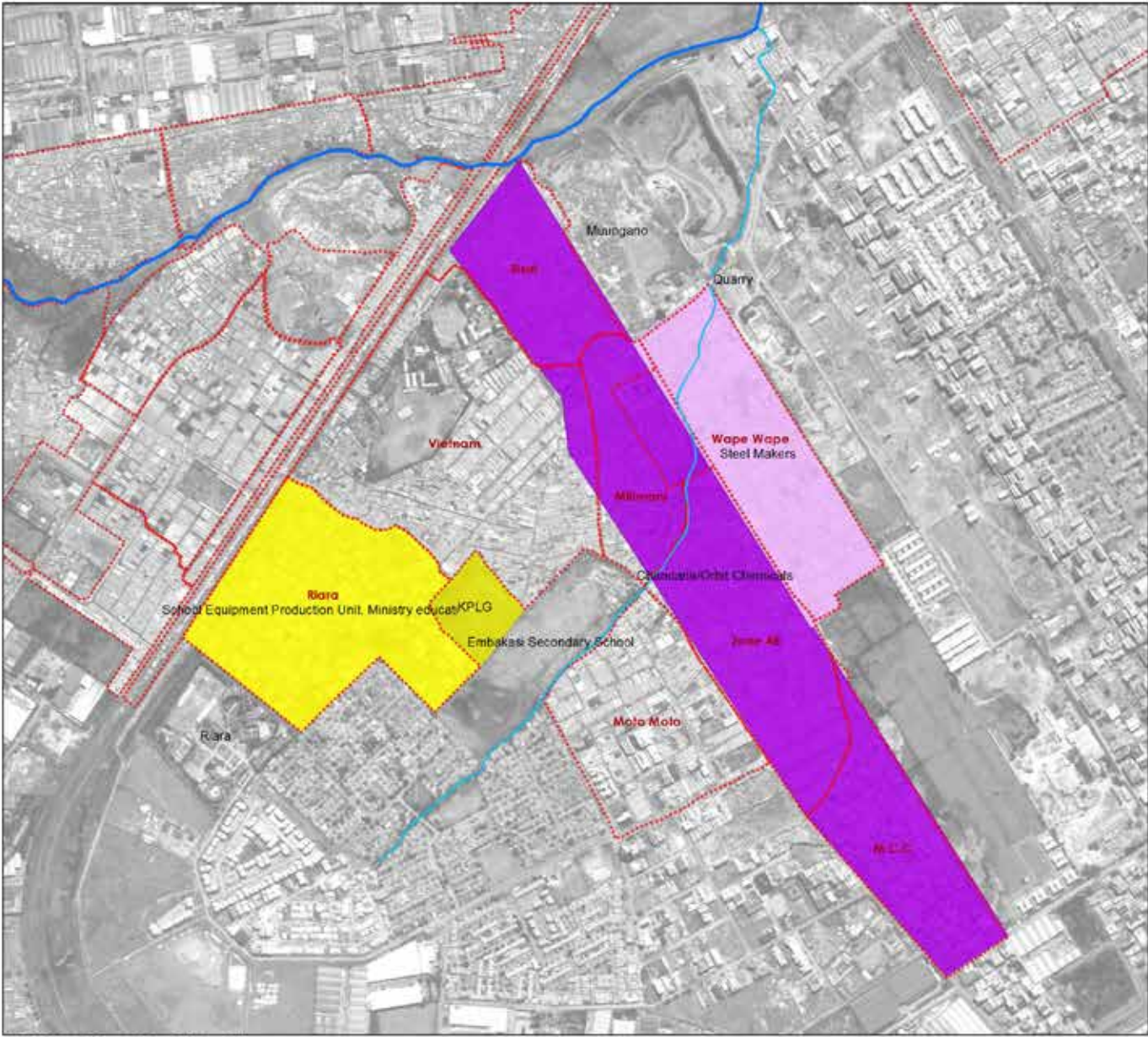
Muluru Kwa Njenga has been developed on undeveloped land of private owners and a small proportion on public land. 14% of the settlement has been developed on or risk areas: riparian reserves, road, railway and power wayleaves. According to the elders of the different communities, around 350 families have to migrate every year due to the seasonal floods around the stream that crosses the settlement between Riara and Vietnam.

Legally, a larger portion of Mukuru Kwa Njenga's surrounding is industrial with a few pockets of residential areas to the south and east of the settlement. The dynamics of ownership in Mukuru Kwa Njenga are complex, as the owners of the structures in the settlement are usually not the owners of the land, with exception of Moto Moto A, and majority of the slum dwellers are tenants and do not own the structures. Insecurity of tenure is considered the main reason as to why the structures are constructed with temporary materials.

Land and structure transactions are made informally through the elders, chairman, chairlady and the chief of the area. The cost of mabati structures ranges from Kshs. 11,000 to Kshs. 57,000 per room depending on accessibility, size, location and the condition of building materials. Generally, the better accessibility and location, the higher the price of the structures. The same parameters drive prices of land. According to chairmen and chairladies of Mukuru kwa Njenga land prices in Milimani and Sisal are similar and lower than in other villages. While those of Vietnam, Riara, Motomoto and Wapewape are also similar and higher: Prime plots 10x15m in Vietnam are Sh. 700,000, while on poor location in Milimani or Old 48 can range from Ksh 200,000 to 400,000 for the same size.

Currently structure owners are pushing to own the land in the informal settlement so as to increase the security of their assets. There are numerous cases in court, most of which are injunctions for demolitions and ownership disputes. One of land owners, a big company owner of around 90 acres of land from MCC to Sisal, was going to subdivide the land and sell part of it to members of the informal settlement. But an ongoing trial recently won by the company can change the future of the settlement preventing the slumdwellers from the right of land acquisition.

Map 4.14.1.
Land use and land ownership
 Source: CURI 2012



Percentage of Land	Owners Use
50%	Industrial
24%	Formal facilities
5%	Residential Owners
21%	Unknown

Table 05. Formal land use. Source: CURI 2012



Informal use of the land

The real use of the land within Mukuru kwa Njenga is very diverse on the ground. It is a mixture of residential, facilities, utilities, and business, without clear designated zones for a specific uses.

The analysis about the current land use of Mukuru kwa Njenga illustrates the amount of land allocated for each use, including a broad estimation of the commercial use allocated to the structures, along the roads, and streets.

CURRENT LAND USE	m ²	%	CURRENT LAND USE (without big schools)	m ²	%
Roads	103,453	9	Roads	103,453	9.52
Community Facilities	136,750	11.85	Facilities	70185	6.46
Commercial (allocated in structures)	12,374	1.05	Commercial	12,374	1.14
Recreation	27802	2.41	Recreational	27802	2.56
Un built space	102000	8.85	Un built space	102000	9.38
Residential	770654 (with footpaths)	66.82	Residential	770654 (with footpath)	70.9
TOTAL	1,153,338 (285 acres)	100	TOTAL	1,086,773 (268.5 acres)	100

Table 06. Current informal land use. Source: CURI 2012

BUSINESS TYPOLOGY	AREA
Shops	12,374m ²
Kiosks	3,861m ²
Vendors	380m ²
Market	540m ²
TOTAL	17,155 m ²

Table 07. Area covered by the different business typologies. Source: CURI 2012

According to the Physical Planning Handbook (Kenya 2007), the current percentages of land allocating the different uses are among the requirements and standards; however, the area is far from having adequate amount of facilities and services to cover the needs of the population, as the population density is extremely high.

The slum upgrading approach developed in this project has considered especially important to analyse the business occupancy, a concept not taken into account in the official standards. Economic life in the informal settlements is a major issue to analyse in order to maintain and promote the local economy and sustainable livelihoods for their inhabitants. According to the situation analysis carried out in the second phase of the project, business in Mukuru Kwa Njenga has been categorized into four main different typologies: shops, kiosks, markets and street vending. The total area occupied by businesses was calculated using broad observation measures that included approximating the dimensions of each business typology and the number of typologies per road length.

Suitable Land Available

In the settlement there is approximately 47.4 acres of suitable open space, making up 15% of the total area. The spaces linked to education facilities are more than one third of the total open space and un-built up plots make up the other third.

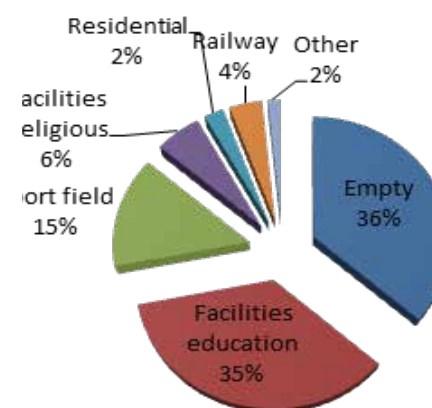


Chart 11 . Land availability. Source. CURI 2012

4.15. Suitability analysis

The land suitability analysis provides the amount of land that is fit for construction. The information has been collected from the field and in the case of the different reserves confirmed by the institutions in charge of them. The suitability of soil for construction is still a gap, so the final amount of suitable land will have to be reconsidered after the soil characteristic information is available (Table 10, right).

With the data collected so far from 285 acres (including the large facilities) of the study area 209.75 acres are suitable, while about 7.2 acres are affected by seasonal floods due to lack of drainage. About 196.2 acres are suitable for building without drastic modifications of the environment. This means that, for 2012, the population density without relocation was 320 persons/acre according to Census data and between 600 and 630 persons/acre based on UIP/MuST population estimations.

This implies that high density urban development should be planned if we are to achieve the objective of accommodating the entire population of Mukuru Kwa Njenga in the suitable area of the settlement.

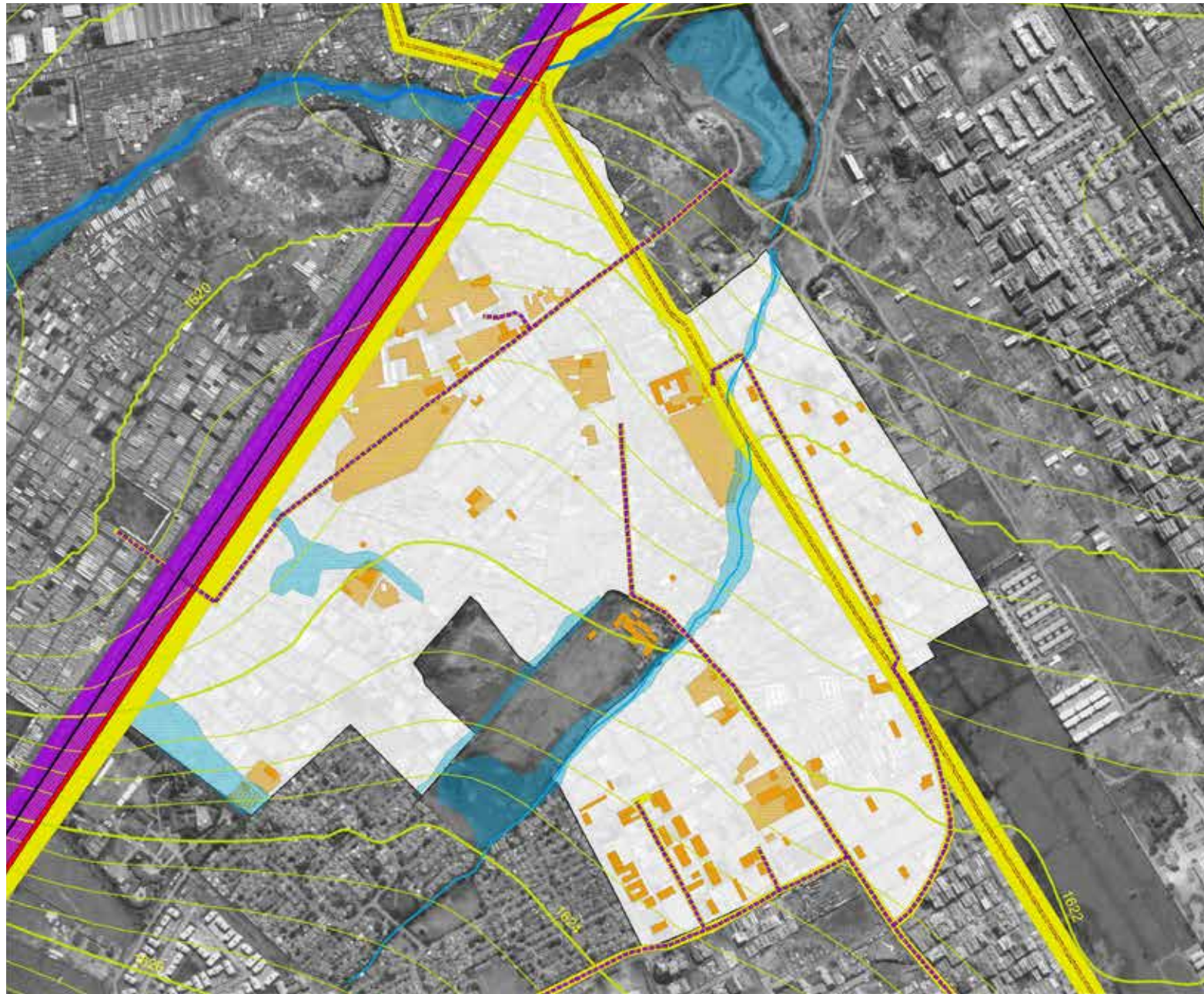


Figure 32. Mukuru Kwa Njenga inhabitants in Riara village. ©Z.G.Blanco, CURI 2012

ITEM		RESERVE	RESERVE AREA (acres)	UNSUITABLE LAND (acres)
TOTAL LAND		285 acres		
RAILWAY LINE		60m(30m affects <u>KwaNjenga</u>)	(Overlapped with 220 KV power line)	0.00
POWER LINE	220KV	60m	18.44	18.44
	66KV	30m	9.72	9.72
	11KV	10m	8.53	8.53
RIPARIAN AREA	<u>Ngong river</u>	60m	(Overlapped with 220 KV power line)	0.00
	Stream water	30m	(655m of streamx30)	4.80
FLOODS	Stream Water		(overlapped with reserve)	0.00
	Poor Drainage			7.21
FIELDS of FORMAL FACILITIES	With big schools included			22.76
PERMANENT STRUCTURES				6.47
AREA OF UNSUITABLE SOIL				GAP
TOTAL UNSUITABLE LAND	With poor drainage			82.44
	With good drainage			75.25
TOTAL SUITABLE LAND				209.75

Table 08. Suitability analysis. Source: CURI 2012

Map 4.15.1.
Suitability analysis
 Source: CURI 2012



Legend

- Ngong River
- Stream water
- Railway reserves
- Power reserve
- Floods
- Open spaces available
- Availabili
- Facility
- Permanent structures
- Power
- Type, Condition
- Power Line 220 KV, Working
- Power Line 66 KV, Working
- Power Line 11KV, Working

0 0.05 0.1 0.2 0.3 0.4 0.5 Kilometers


Map 4.15.2.
Suitable Land
Source: CURI 2012





Legend

Available area

Category

 Suitable

 Suitable with drainage

 Unsuitable land

4.16. Population projection

In order to calculate the population that can be housed on the suitable land in the next 20 years, population projections have been estimated taking into account the growth rate between 1999 and 2009 according to the National Census.

The UIP research found that the average growth rate in Nairobi slums according to the Kenya National Bureau of Statistics has been only 0.28%, 13 times lower than the National growth and 10 times under Nairobi's growth rate, 3.8% and 3.0% respectively. Despite been considered a very low rate, the data has been taken as a reference due to lack of different sources.

According to the three population scenarios determined (KNBS Census, UIP based on structures, and MuST enumeration), the population and households projections on the suitable area, at a growth rate of 0.28%, has been calculated, as well as the housing projection and the densities required to house the whole of Mukuru Kwa Njenga on the suitable land from 2012 to 2030.

SOURCE	POPULATION		HOUSEHOLDS		DENSITY (persons/acre)	
	Year 2012	Year 2030	Year 2012	Year 2030	Year 2012	Year 2030
Census	67,065	70,526	24,838	26,120	319	336
Structure based analysis (UIP)	125,642	132,127	41,880	44,042	599	630
Must enumerat ion	131,843	138,648	43,947	46,216	628	661

Table 09. Population, households and expected densities for 2012-2030.

Source: UIP 2012

Land budget

With the number of households needed in the three scenarios various approaches have been tested in order to develop an upgrading strategy and urban planning that achieves the human needs of the area and provides quality of life for Mukuru Community.

In an urban development, various requirements need to be honoured. Residents should move easily within their environment and have access to services such as water, sanitation, electricity and solid waste collection. Open spaces should be left unbuilt to serve as social spaces for the community, to enhance environmental ambience, and create an aesthetic appeal. Community facilities should be provided for the community in order to serve their need for education, health, religion and socialization. These facilities create healthy and able communities that support the economic prosperity of a nation. Moreover, in connection with the commercial provisions, the development of the community is greatly enhanced.

According to the City Council of Nairobi Regulation, a plot ratio of 75% and plot coverage of 50% is recommended for Imara Daima and Villa Franca estates, the two main residential areas bordering Mukuru Kwa Njenga. The urban development of the area according to these standards would leave people without land estimated at between 11,642 (based on population Cesus) and 31,254 families (based on MuST), thus more than double of the existing population estimated by MuST and UIP would have to be relocated in other areas.

In order to accommodate the population and elements of a sustainable neighbourhood in Mukuru Kwa Njenga, a reconciliation of the standards with the real picture of the slum has been explored. Different options have been tested and finally three approximations have been proposed in an approach to satisfy the three scenarios (Census, UIP and MuST). The three proposals go for a plot coverage of 75% instead of the 50% set in the City Council Regulation. Plot ratios of 200%, 300%, and 400% have been tested instead of the 75% suggested in the City Council Regulation. These three proposals will generate an urban development of between two and four storey building:

DESCRIPTION	%		Final item
Land size			967118m ² {238.98 acres}
Roads and streets (power and sewage reserves included in the same area)	15%	0.15x967118m ²	145,067.7m ²
Community Facilities	8%	0.08x967118m ²	77,369.44m ²
Recreational	7%	0.07x967118m ²	67,698.26m ²
Residential + Commercial	70% (68%+2%)	Chart Area 0.7x967118m ² (0.68x967118m ²) (0.02x967118m ²)	676,983 m ² (Residential=657,640m²) (Commercial=19,342m²)
No. of housing units achievable: Residential area x plot ratio / average household size	Plot ratio 1.5	1.5 x 657,640m ² /48m ²	20,551 households
	Plot ratio 2	2 x 657,640m ² /48m ²	27,401 Households
	Plot ratio 3	3 x 657,640m ² /48m ²	41,102 Households
	Plot ratio 4	4 x 657,640m ² /48m ²	54,803 Households

As shown in table 11, a combined plot ratio of 1.5 and 2 would be enough to cover the household needs till 2030 according to the Census. However, according to the population projections based on UIP estimations and MuST enumeration, a combined plot ratio of 3 and 4 must be applied in order to cover the needs of housing in the settlement. With these findings the two main scenarios, Census and UIP/ MuST will be taken into account to define the upgrading plan for the area.

*Average 40m² per household (including % of walls) +20% for common spaces(8m²) = 48m² per household

Table 10. Land Budget according to the three different approaches (2012 and 2030). Source: UIP 2012

		Year of projection	Census. No. of households counted on site		UIP. No. of households counted on site		MuST. No. of households counted on site	
			Housing units achievable – housing needs	Households deficit/oversupply	Housing units achievable – housing needs	Households deficit/oversupply	Housing units achievable – housing needs	Households deficit/oversupply
Deficit in housing units (assuming 1household per unit) P=population(1+GR) ⁿ /PH GR= Growth ratio PH=persons per	Plot Ratio= 2	2009	27,401-24335	3,066	27,401-41531	-14,130	27,401-43580	-16,179
		2012	27,401-24838	2,563	27,401-41880	-14,479	27,401-43947	-16,546
		2015	27,401-25048	2,353	27,401-42233	-14,832	27,401-44317	-16,916
		2020	27,401-25401	2,000	27,401-42828	-15,427	27,401-44941	-17,540
		2030	27,401-26120	1,281	27,401-44042	-16,641	27,401-46216	-18,815
	Plot Ratio = 3	2009	41,102-24335	16,767	41,102-41531	-429	41,102-43580	-2,478
		2012	41,102-24838	16,264	41,102-41880	-778	41,102-43947	-2,845
		2015	41,102-25048	Chart Area	41,102-42233	-1,131	41,102-44317	-3,215
		2020	41,102-25401	15,701	41,102-42828	-1,726	41,102-44941	-3,839
		2030	41,102-26120	14,982	41,102-44042	-2,940	41,102-46216	-5,114
	Plot Ratio	2009	54,803-24335	30468	54,803-41531	13272	54,803-43580	11223
		2012	54,803-24838	29965	54,803-41880	12923	54,803-43947	10856
		2015	54,803-25048	29755	54,803-42233	12570	54,803-44317	10486
		2020	54,803-25401	29402	54,803-42828	11975	54,803-44941	9862
		2030	54,803-26120	28683	54,803-44042	10761	54,803-46216	8587

Table 11. Houses achievable with the different plot ratios per year of projection. Source: UIP 2012

Section 5

URBAN PLANNING PROPOSAL

The current proposal for Mukuru Kwa Njenga urban planning and design has been transformed from a less technically-driven process to a more community driven one emphasizing on sustainable development that is socially and environmentally friendly.

The urban plan and design of the area will depend on:

- Population densities of the area
- Guiding planning standards and techniques
- Current land use and organization
- Social facilities and business needs
- Social structure of the community
- Landscape disposition and natural environment
- Official plans that have already been laid out in the past for the future

Slum upgrading is a form of urban renewal whose dynamics in planning and design may differ from the conventional methods. High population densities, low incomes, urban congestion and lack of open spaces in hand with the complexity of ownership and tenure dynamics greatly will affect the approach in planning and design of the area. Social structure and economic dynamics will be key factors that determine the proposed concept.

5.1. Upgrading strategy

The upgrading plan is seen in this approach as an urban transformation process done in phases that will depend on the rights that slum dwellers gain over the land they have irregularly settled on. This fact has been taken into account to design the urban layout, so the parceling of the land blocks is broadly aligned with the land parcels under legal ownership, with exception of Vietnam which has scarce information about the land owners.

The general strategy to upgrade the area should be discussed with the communities participating in the process, but as this is a first approach, a draft of the strategy has been outlined based on the research done with Mukuru community itself and other slum upgrading experiences.

Land and Tenure

- Negotiating land tenure terms collectively with land owners and structure owners, where all the stakeholders have potential benefits from the upgrading program of the area.
- Create different affordable approaches to achieve a secure tenure to meet different economic possibilities (ownership system but also rent system that ensure the right to housing for the less economically capable).

Housing

- Design of varied house typologies based on the assessment of the community to provide options for the people and meet different needs (regarding to different cultures, use of the space, size of the family).
- Flexible designs, giving chance to people to personalize their households and easily make modifications in order to meet future needs (in case of growth of the family, need to combine it with business, etc.).

Construction process

- Implementing in phases according to the land acquisition but also to give time for acquisition of funds.
- Minimizing contractor involvement. Use of local labour to reduce costs and provide a source of income for the people to service their loans.
- Buying building materials collectively to get better prices and benefit from economy of scale.
- Utilization of recycled materials from the old settlement to reduce the cost of the construction process.

Affordability

- Using microfinance to fund the projects and empower the people is a key factor that can contribute to the success of the project. Savings groups or co-operatives could access loans at subsidized rates that are easier to acquire. Also daily savings groups cater better for the low income earners compared to those of a longer period and are easier to manage, co-ordinate and reap funds from.
- Though individuals are financed with loans, other opportunities to pay back/service the loans can be provided e.g. Jamii Bora- individuals working in the factory.

Capacity building

- Full community participation and ownership so as to create ownership; all stakeholders should be involved throughout the process and their needs catered for.
- Building the capacity of the community and skills transferring during the process to run their own affairs reduces time and cost, creates efficiency in the program and builds capacities for the future of the community.
- Community planning can be an option to involve the community in their own development and meet the real needs of the different groups of interest.

Stakeholders

- The stakeholders can be as broad as desired, though managing very large groups has its own limitations. The community of Mukuru with the different groups of interest will be the main one (structure owners, elders, chairman and chairlady, youth groups, women groups, disabled persons, etc.), but also the Chief and Assistant chief and the local authorities should be involved in the process, as well as the land owner, the government, the private sector, organizations working in different fields of specialization and the University developing the current slum upgrading approach. Multilateral support like the one provided by World Bank or UN-Habitat could boost the process.
- Creation of a multidisciplinary working group can be an important point to meet appropriately the requirements in each field of action, be efficient and find the most economical way possible (lawyer, land tenure expert, planners, architects, anthropologist and sociologist, sustainable development expert, infrastructures experts, etc.)

- Involving the government and other key institutions can create antecedents towards sustainable ways of slum upgrading in the government itself, so the experience can be replicated in other slums. It can also aid in facilitation, mobilization and co-ordination.



Figure 33. UIP team with representatives of Mukuru Kwa Njenga community.
©Z.G.Blanco, CURI 2012

5.2. Urban approaches

General urban planning approaches

The general urban planning approach taken by UIP is a neighbourhood-oriented upgrading strategy that will see an urban transformation and re-development adapted to the social, spatial and economical needs of slum dwellers; an urban space for people. It is a compact re-development with mixed uses and a pedestrian approach that will try to support sustainable livelihoods, incorporating the broad scope of economic formality and informality.

Mobility and accessibility

- Connection with the urban layout and integration of the area with the city. Major road spines to connect North-South and West-East with the CBD and other surrounding areas like Thika and Mavoko. The minor spines to ensure circulation and permeability within the slum.
- Introduction of public transport in the area
- Pedestrian approach to be compatible with motorability.
- Pedestrian connection of the slum with the main economic area around: footbridge into the industrial area to facilitate the movement of some people to their places of work.

Land use

- Mix use development.
- Transforming the challenges to opportunities. Use of the power and riparian reserves for compatible activities: the secondary power distribution line reserve to be used as an economic corridor and the stream riparian to be used for recreation and as a pedestrian walkway but also for kiosks and other street business.
- Negotiation of the reserves.

Facilities

- Conservation of permanent facilities. Cluster relocation of non-permanent facilities.
- Link of open spaces to social facilities in order to create lively public spaces. This minimizes the threads of isolation such as insecurity, underutilization or misuse.

Major Infrastructure

- Planning for the integration of the current infrastructures management by the different individuals and groups (water, electricity and sanitation) and involvement of the affected people in the formal infrastructure management system.
- Use of the current infrastructure under construction (sewer and water) and completion of the same with appropriate technology infrastructure.
- Maintenance of strategic public toilets, bio-centres and water point Kiosks.
- Promotion of organized solid waste collection and management by the existing youth groups. Planning of a community managed waste transfer station.

Economic network

- Ensure sustainable livelihoods by enhancing the economic network. Negotiation and adaptation of the upgrading strategy to the current economic life and involvement of informal services supply. Provision of front ground floor economic units; combination of house and business typologies for home-based works; and provision of space along the streets for kiosks and street vendors.

Identity

- Conservation of the main landmarks as signs of identity in the settlement
- Emphasize the identity, social cohesion and current empowerment of Mukuru community towards the creation of a new Mukuru that reflects its community.
- Participatory approach through community planning could be the next step towards the identity mainstreaming in the urban plan.

Two different urban concepts following the above approaches have been proposed

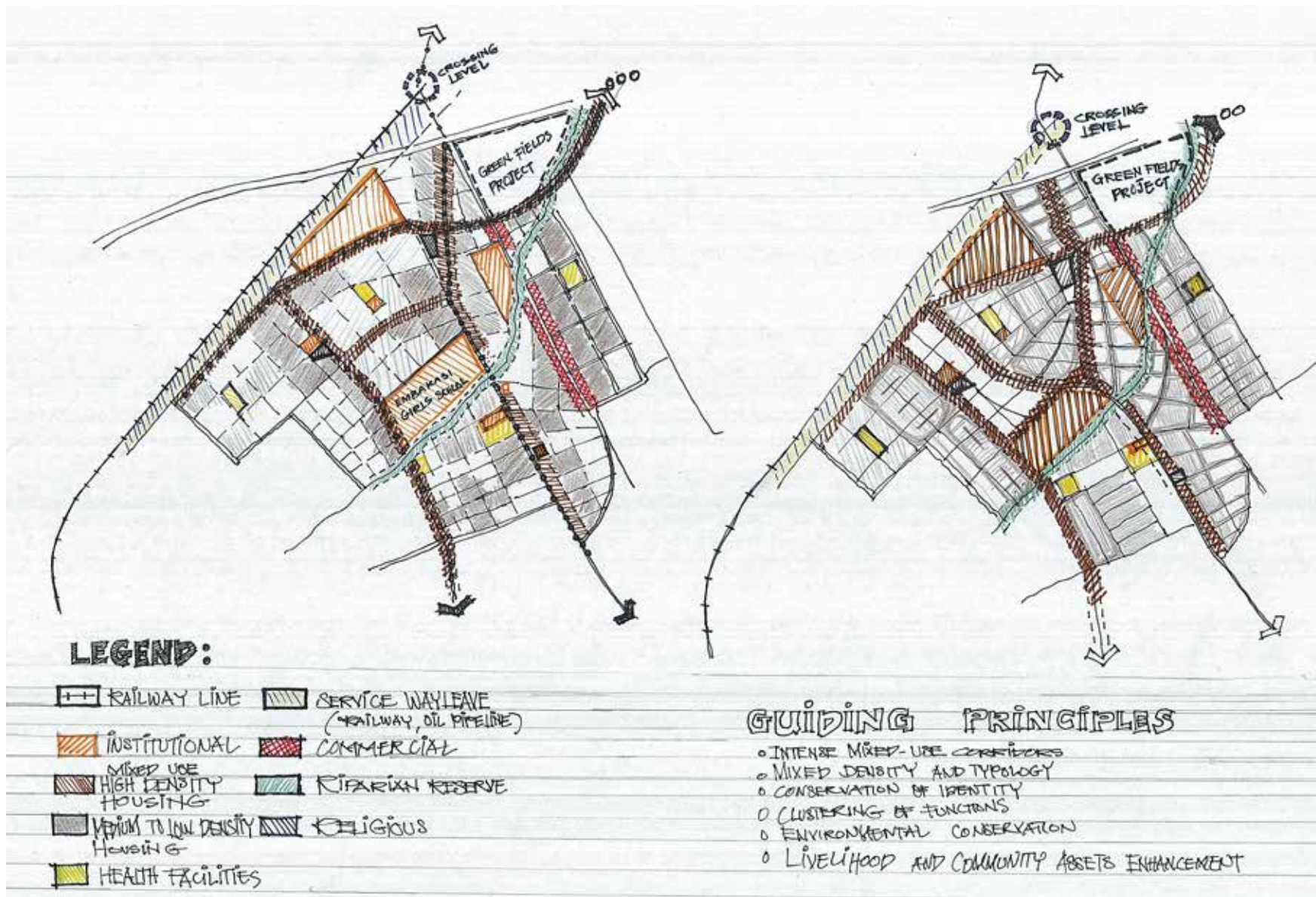


Figure 34. Urban layout following the Structure Plan. Source. CURI 2012

Figure 35. Urban layout following the Sewer lines and Structure Plan. Source. CURI 2012

Mobility and communications

Integration of the area with the city

Mukuru Kwa Njenga, like other slums in Nairobi, is characterized by the poor communications and lack of integration of the area with the city. Good mobility and communications are among the pillars for developing an area. Creating a communication link with the city and the main areas of employment will determine the main spines of the urban plan. The motorable and non motorable networks will then define the urban layout of the settlement. Several conditions are respected in an attempt to work in coordination with the existing urban Plan, restrictions and infrastructure in place:

- Reserves for power, railway and riparian and floods
- Structure Plan -Ministry of Urban Development and Housing 1976
- Sewer lines and water lines in place.(Still under construction by NAWASCO)

Transforming the limitations into opportunities

In this upgrading process, a major strategy in approach is to transform the limitations into opportunities. This can be addressed as follows;

- The main sewer** line under construction that crosses the area from south to north will also be used as a main movement spine connecting Mombasa Road and the CBD with enterprise road where many people are employed.
- The riparian area along the stream** that crosses the slum will be transformed into a major recreational area hence serving as a place to relax and for children to play. This riparian stretch will also have a walkway on the side that will connect east-west and can accommodate small mobile business. The stream can be canalized to minimize the incidence of seasonal flooding and the size of the riparian reserve can be negotiated with the pertinent authorities from the current 30m to 20m or even 15m.
- The secondary electricity distribution line power reserve** of 30m wide can also be used as the main economic space, hence conserving WapeWape main economic road by moving it to this parallel street just few meters from the original routing.

The current clusters will be respected conserving the main characteristics of urban layout (Main roads, economic areas), but introducing order and road hierarchy in the re-development to avoid poorly communicated areas and thus insecurity. The main road and streets have been categorized as follows:

- I. Main motorable spine (two way) -12m
- II. Primary motorable lines (two way)- 9m
- III. Pedestrian streets;
 - a. With an allowance for motorability - 6m.
 - b. No allowance for motorability - 4.5m
- IV. Power reserve: Motorable Street with pedestrian approach -30m

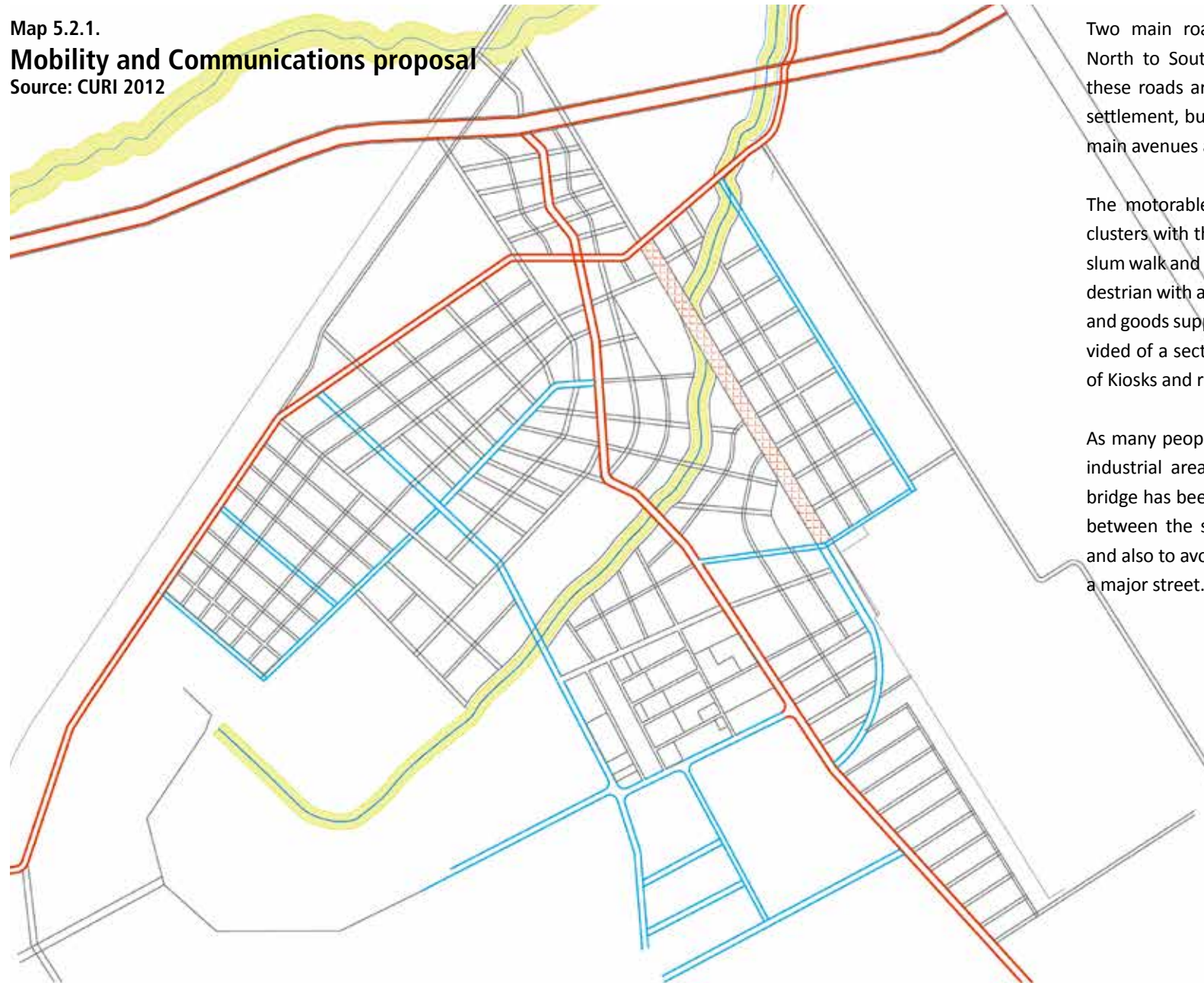


Figure 36 UIP first drafts Mukuru Kwa Njenga Upgrading Project.
Source. ©Z.G.Blanco, CURI 2012

Map 5.2.1.

Mobility and Communications proposal

Source: CURI 2012



Two main roads cross the development from North to South and East West. Larger parts of these roads are currently the main roads of the settlement, but now connected and linked to the main avenues around.

The motorable roads will connect the different clusters with the main roads, but as people in the slum walk and cycle, most of the streets will be pedestrian with allowance to fit a vehicle for services and goods supply to businesses. Roads will be provided of a section that can allow implementation of Kiosks and reserved areas for street vendors.

As many people in the slum are employed in the industrial area, a footbridge linked to the train bridge has been planned to facilitate the mobility between the settlement and the industrial area and also to avoid the current use of the railway as a major street.

LEGEND.

-  Main Spine
-  Primary road 2 ways
-  Pedestrian street
-  Riparian / Recreational
-  Commercial / Power rsv

Clusters and densities

In promoting the quality of the urban space, clustering of densities needs to be observed appropriately. The more dense areas should be clustered around the wider roads and streets and the less dense areas clustered around the smaller roads. In order to avoid urban congestion the urban layout has been designed with sections whereby the height of the buildings is not more than two times higher than the width of the road or street.

The higher density areas have been planned in the current higher dense villages in order to minimize the relocation of families even between villages. The current clusters by villages are conserved and differentiated by different layouts, densities, economic activities intensity and urban design as per local needs.

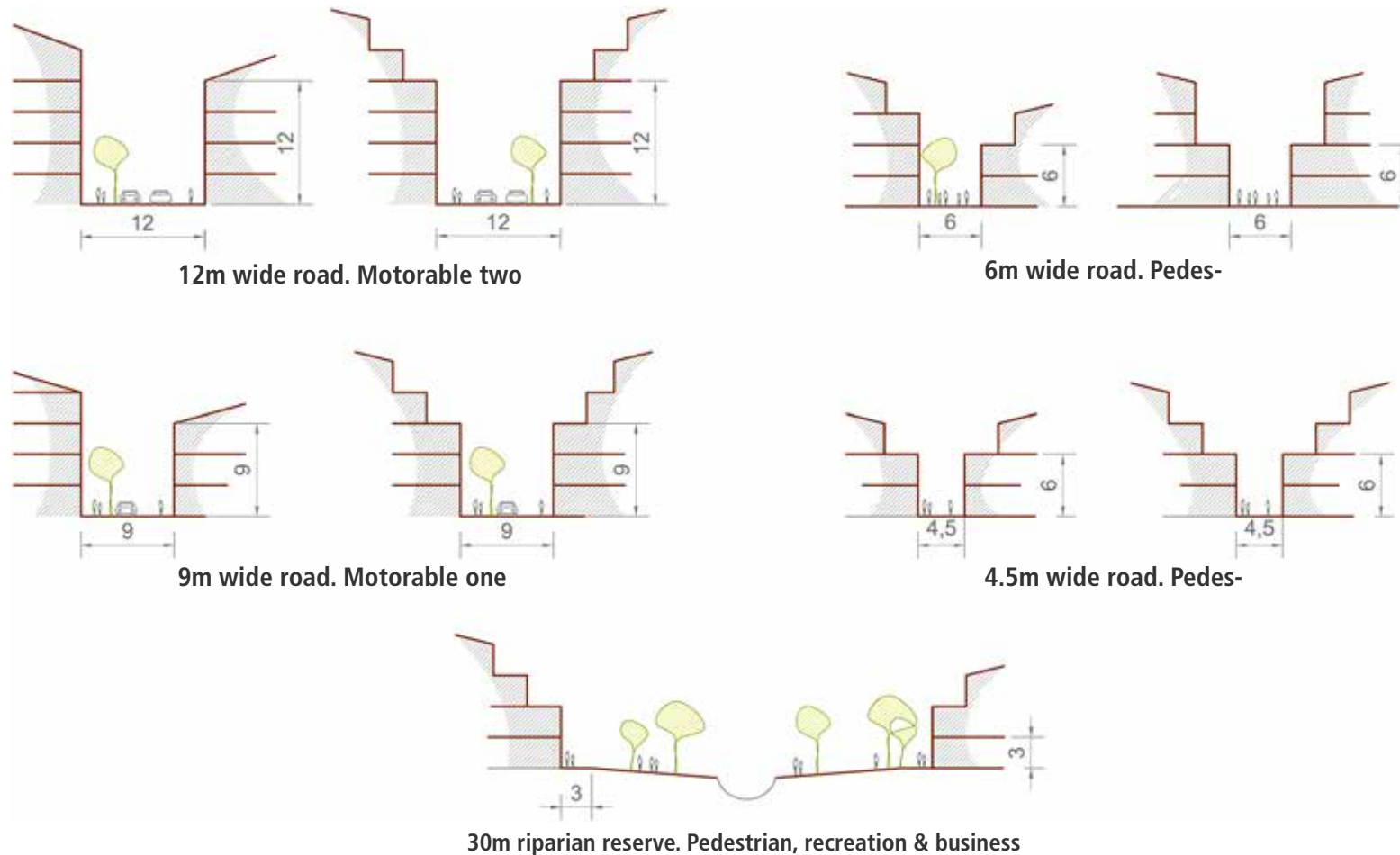
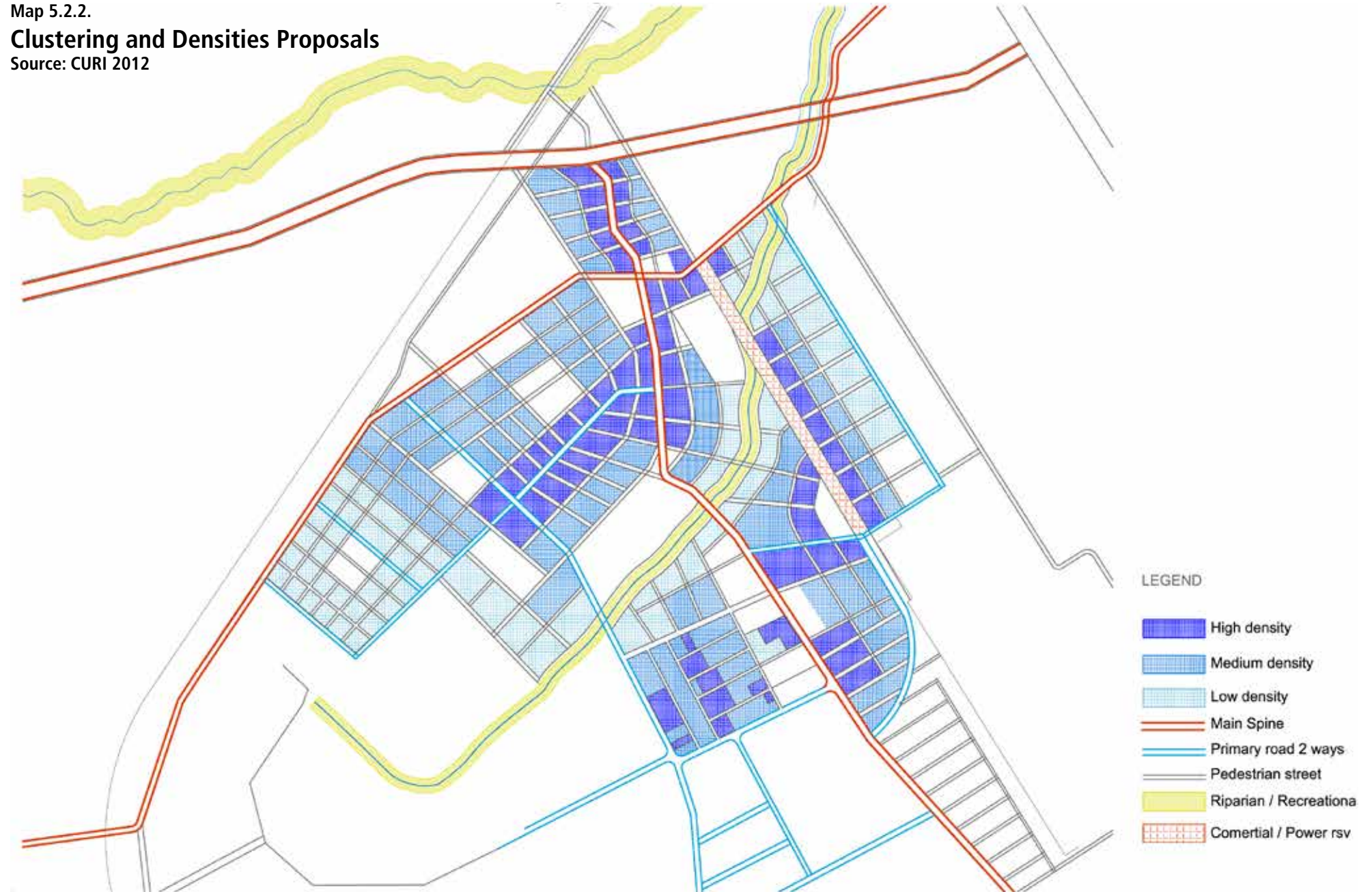


Figure 37. Road Typologies proposal . Source. CURI 2012

Map 5.2.2.

Clustering and Densities Proposals

Source: CURI 2012



Blocking out

The blocking layout will be flexible depending on the needs and the layout of each area. The housing units will be clustered in blocks conserving the current needs of the community and giving importance to the common spaces. Through The conceptual conservation of the current structure of organization it is tried to retain the sense of security, the use of the common spaces for housing labors, meeting or just socialization, that at the same time maintain the identity of Mukuru inhabitants and sense of place.

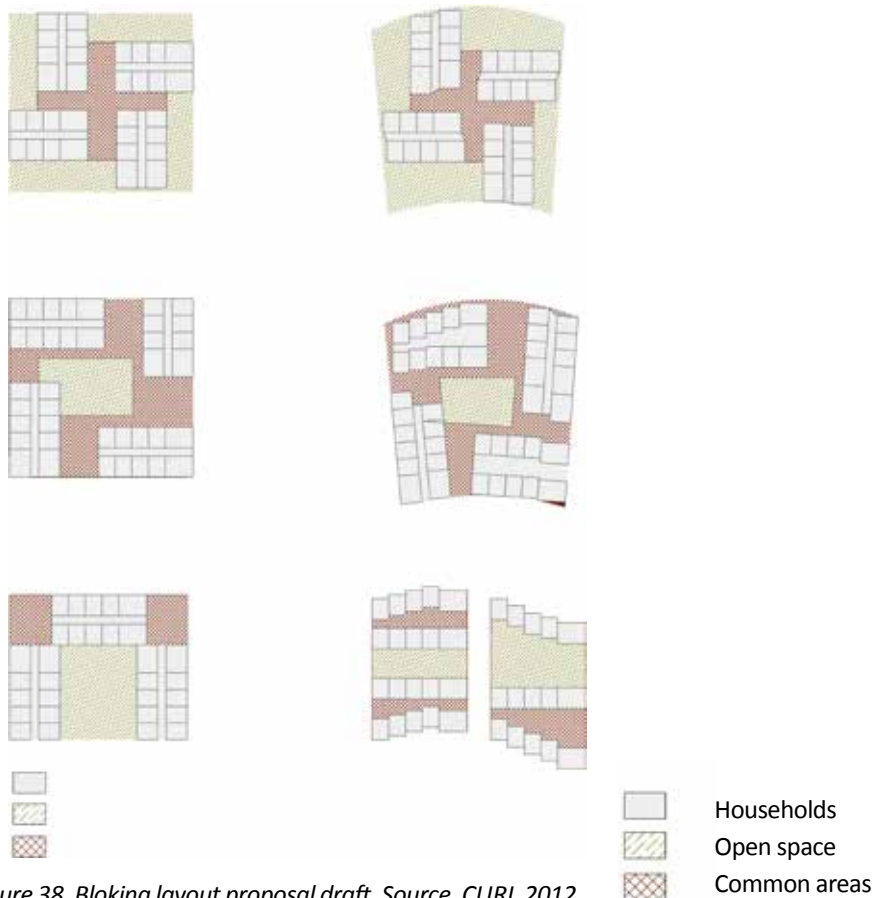


Figure 38. Blocking layout proposal draft. Source. CURI 2012

DESIGN CONCEPTS

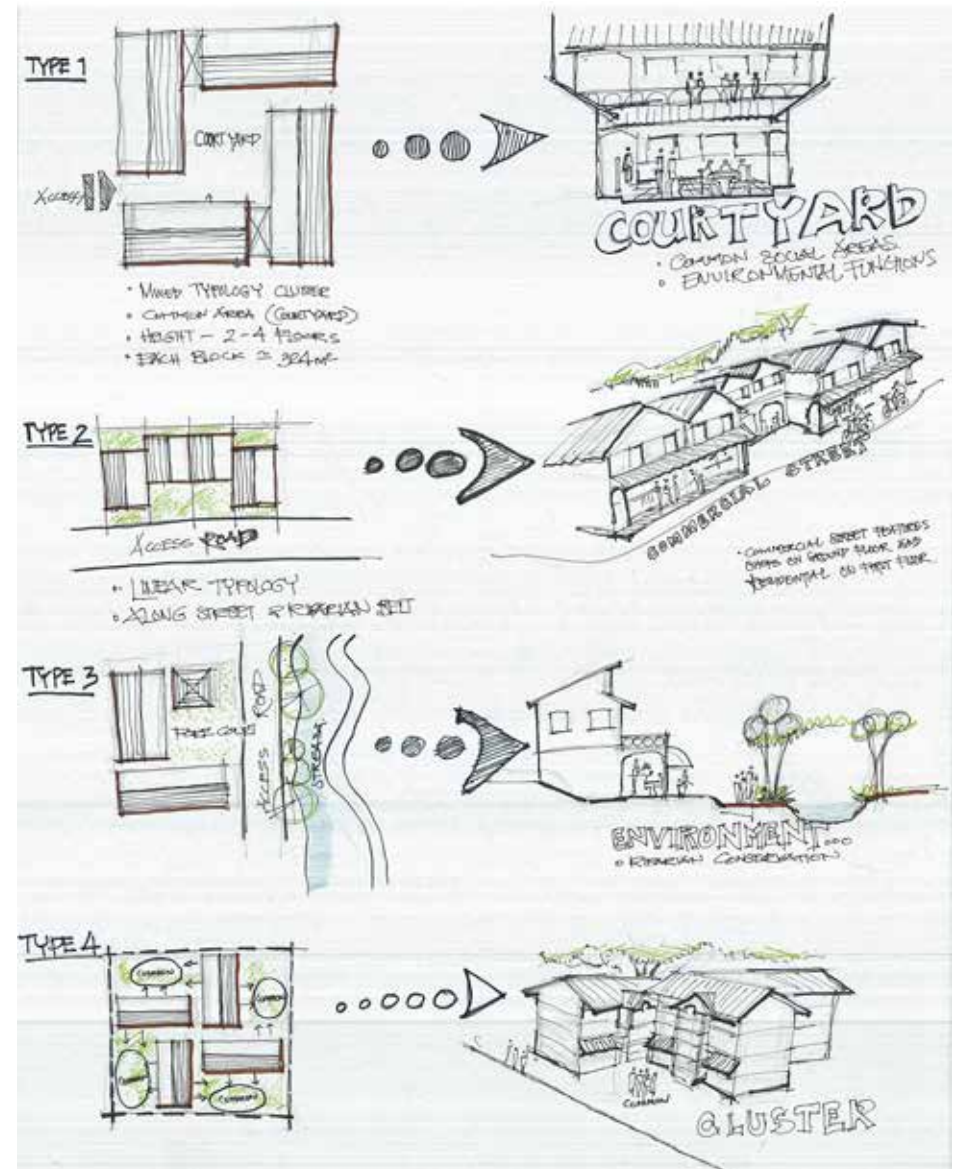


Figure 39. Block design concepts . Source. CURI 2012

5.3. Program of accommodation

According to the upgrading strategy prepared in phases, the program of accommodation has been divided into two: Residential/commercial and social facilities/utilities. A table with different scenarios has been prepared in order to calculate and estimate the population that can be allocated on each piece of land as well as the needed facilities regarding the population needs.

Residential

According to the land budget proposals and the different ownership of the land, the program can be prepared in phases per land unity. If we take the different scenarios analysed, with a plot ratio of 200%, 300 and 400% and a 68% of residential area (based on Planning Handbook standards), the accommodation would be as shown below:

LAND OWNER	VILLAGES	TOTAL AREA (m ²)	SUITABLE AREA	RESIDENTIAL (68%)	RESIDENTIAL CONSTRUCTED (m ²)			NO. OF HOUSEHOLDS			POPULATION		
			(m ²)		Plot ratio=200%	Plot ratio=300 %	Plot ratio=400 %	PR 200	PR 300	PR 400	PR 200	PR 300	PR 400
CHANDAR IA	Sisal, Milimani, Zone 48	284,544	266,107	180,953	361,906	542,859	723,812	7,540	11,310	15,079	20,357	33,929	45,238
STEEL MAKERS	WapeWape	126,295	117,258	79,735	159,470	239,205	318,940	3,322	4,983	6,645	8,970	14,950	19,934
SEPU	Riara	202,435	182,592	124,163	248,326	372,489	496,652	5,173	7,760	10,347	13,968	23,281	31,041
KPLG	Sport field Riara	26,089	26,089	17,741	35,482	53,223	70,964	739	1,109	1,478	1,996	3,326	4,435
UNKNOWN	Vietnam, Moto Moto	513,975	256,770	174,604	349,207	523,811	698,414	7,275	10,913	14,550	21,825	32,738	43,651
TOTAL		1,153,338	848,816	577,195	1,154,390	1,731,585	2,308,779	24,050	36,075	48,100	67,116	108,224	144,299

Table 12. Residential program of accommodation. Source: CURI 2012

Social facilities and utilities

Some of the formal social facilities within the study area are the permanent facilities that have been conserved. They serve as important landmarks for the people of Mukuru. These conserved facilities include Kwa Njenga Primary School, Our Lady of Nazareth Primary School, Medical Missionary of Mary Clinic, Chaminade Training Center, St Mary's Parish, the Mosques, SIDAREC, Comido School and Red Roof School. The total acreage allocated to some of the facilities has been reduced so as to increase the total suitable land available for development.

The informal facilities which are located in non-permanent structures have been clustered together and redistributed across the settlement according to the catchments recorded in Table 13.

TYPE	No.	FORMAL/ INFORMAL	CATCHMENT	CURRENT LAND (m ²)	ASSIGNED LAND (m ²)
EDUCATION		Formal or permanent structure	1944 pupils	30496	30496
EDUCATION	43	Informal in no permanent structure	7369 pupils	13580	30641 m ²
HEALTH CLINICS		Formal or permanent structure	149 pers/day	1435	1435
HEALTH CLINICS	39	Informal in no permanent structure	49 pers/day	...	4000 m ²
RELIGIOUS		Formal or permanent structure	....	3819	3819
RELIGIOUS	63	Informal in no permanent structure	....	.....	2638 m ²
SOCIAL HALLS	2	....	....	106	3000 m ²
TOTAL m2				95,328m ² or 10% of the suitable land	

(These do not include the two large education facilities i.e. Our Lady of Nazareth Primary School and KwaNjenga Primary School)

Table 13. Social facilities allocation sizes. Source: CURI 2012

According to the Physical Planning Handbook, an education facility serving a catchment of 1000 pupils should be allocated 3.9Ha (9.6Acres). There are about 9000 pupils attending the informal schools within Mukuru KWA Njenga, therefore if the standards were to be adhered to a total of 35.1Ha (86Acres) of land should be provided for, which is more than one third of total suitable land. To allocate a more reasonable amount of land to facilities a methodology considered adequate for slum upgrading standards has been applied as it is indicated in the following proposal.

Proposed Accommodation for Facilities:

- It has been proposed that each village should have one main facility for health and another for education.
- Non-permanent Schools: These are to be combined into four large education facilities and are to be linked to the current existing permanent structures set out as education facilities. Each pupil is to have 7m² (1m² per class and 6m² common spaces). The current system will have to be adapted according to the people whose source of income is the informal education facilities.
- Health: Four large clinics are to be planned for. They will be located close to education facilities and each clinic is to have about 60m². Some clinics can be located on the ground floor of the residential blocks. As small clinics are also a source of income, ground floors of the buildings can be used for that use.
- Religious: 10 main religious facilities will be provided. Ground floors can be also used for religious purposes.
- Halls: the plan is to include three social halls in the area, each covering 1000m². They can be linked to education facilities or located in the ground floor of the buildings.



Figure 40. UIP drafts of facilities maps Mukuru Kwa Njenga Upgrading Project. Source. ©N.Omar, CURI 2012

Map 5.3.1.

Facilities and Open Spaces Proposal

Source: CURI 2012



5.4. Housing

Current housing

According to the MuST enumeration done in 2009 for the villages of Sisal, Milimani, Vietnam and Riara, the number of persons per dwelling unit has been calculated in order to plan the housing layout and compute the percentages of dwelling units for 1, 2, &3 bedrooms that should be designed.

In average, to our surprise the percentage of households with 1-2 people is the most common, followed by 3-4 persons per household. According to MuST information, a low percentage of households have more than 4 persons (Table 14).

Proposed household typologies

According to the standards of other slum upgrading projects in Kenya (Kambi Moto and Mabatini) and the studies done by Manchester City Council and London Borough of Bromley about the minimum spatial needs, it has been considered that an average of 40m² per household is adequate for human needs.

Three different typologies have been designed according to the sizes of the families, and a flexible design will be used to shape the households regarding to cultural and family needs.

According to the housing analysis, 72% of the households, have 1-2 persons. 23% of the households have 3-4 persons and 5% of the household have 4 persons and above. So three different sizes have been proposed based on the minimum space standards.

The building technology proposal will depend on the agreements with the community. In the first place the team will propose an appropriate technology economic, environmental friendly and easy to use. It is a building technology with Interlocking Stabilized Soil Blocks (ISSB). Stabilized soil as building material is very convenient when the quality available locally is good enough for construction purposes.

NUMBER of PEOPLE PER HOUSEHOLD	AVERAGE PERCENTAGE
1-2	72%
3-4	23.5%
>4	4.5%

Table 14: Average Percentages of No. Of People per Household
Source: CURI 2012

Number Bedrooms	Persons	Area	Total area needed according to Census population	Total area needed according to <u>MuST</u> population
1 Bedroom	1-2 persons	Chart Area	462,280 m ²	919,937 m ²
2 Bedroom	3-4 persons	41m ²	260,350m ²	518,096 m ²
3 Bedroom	4 persons and above	60m ²	76,203m ²	151,644 m ²
TOTAL	Total area common (20%)	+ spaces	798,833 + 20% = 958,600 m²	1589677+ 20% = 1,907,612m²

Table 15. Housing typologies, area per typology and total constructed area needed according to the different scenarios. Source: CURI 2012



Figure 41. (left) Interlocking Stabilized Soil Blocks. Source. UN-Habitat
 Figure 42. (right) Interlocking Stabilized Soil Blocks. Source. Sri Lanka Spirit

ISSB technology has proven to be strong and durable when compared with traditional method of construction. It is suitable for multistory building, has a good compressive strength and in many examples has been used for the retaining wall of buildings.

The challenge of a technology based on earth as a building material is to be accepted for the community.

Housing layout

The housing layout should be incorporate the following values:

- Security- the current housing layout enhances the security through communal living. The design strategy should incorporate this approach in order to maintain the sense of security.
- Identity and Lifestyle– the identity of the slum should still be preserved because it sustains the lifestyle the people are used to. Disrupting this would interfere with their social life.
- Communal spaces – the housing layout should cater for the provision of communal spaces for children to play, spaces to wash and hang the clothes and also to socialize.

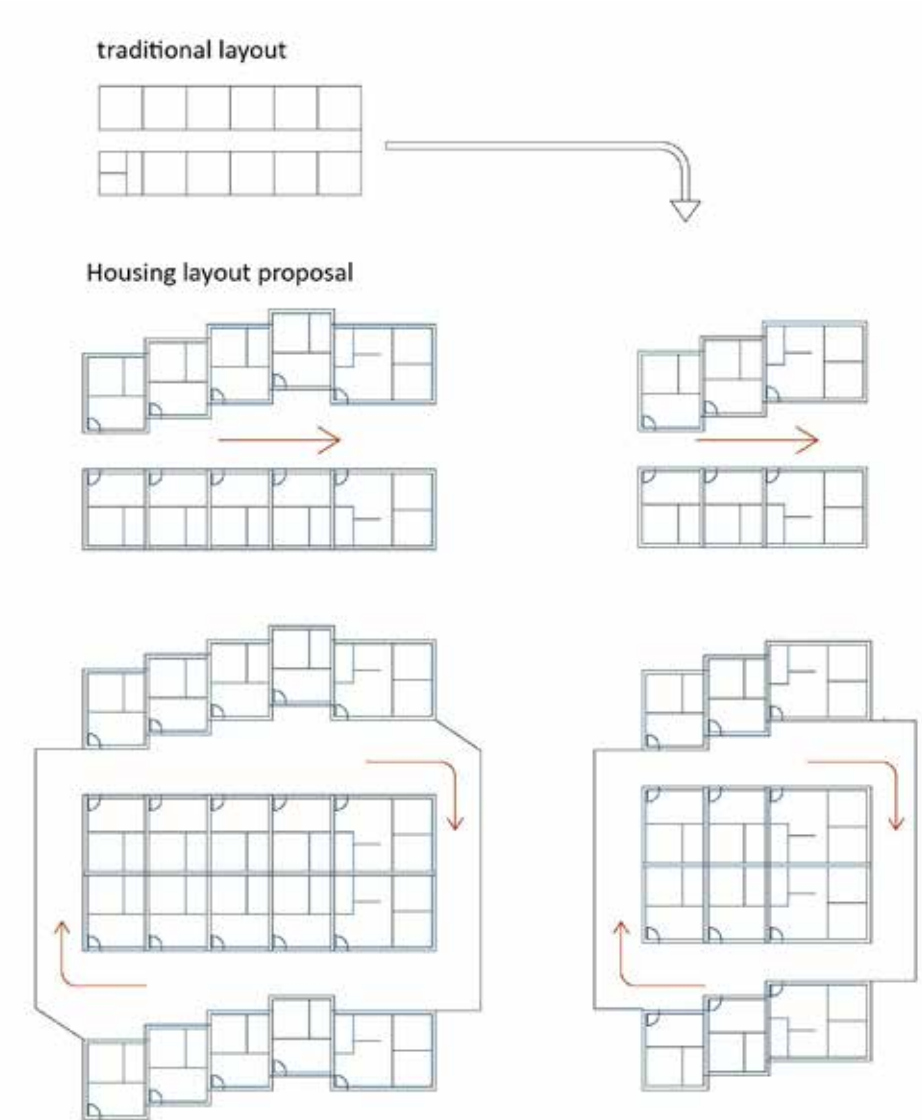


Figure 43. Housing layout. Source: CURI 2012

Infrastructures and services

Construction process

1. Utilization of local labor and local materials

In regards to promotion of local labor, It should be discussed the option of capacity building and employment of slum dwellers in the upgrading project. It would be a way to involve the community in its own development and strength the feel of ownership, it would provide a source of income, it would be a way to get cheaper prices of the construction and it would be a way to empower the community, supporting the future maintenance and sustainability of the end product.

Apart from that, the project can also maximize on the use of the local building materials that are easily available in the area since this will promote the local economy. On top of that it will help in saving the costs of the upgrading project since the cost of transportation will be reduced.

Compared to that of the conventional way of delivery using equipment intensive approaches, local resource-based approaches have proven to be economically and financially competitive, socially beneficial and in the longer term, lead to national sustainable development.

Reduce, reuse and recycle approach

The upgrading project should take advantage of the existing local resources so as to encourage sustainability which will reduce costs in long term. Some procedures that can be applied in regards to maximizing the local resources that are available include the following: Introduction of water conservation techniques that can be used to tap rain water; Use of improved earth construction systems; Bringing in the aspect of recycling as a way of waste management; and the use of biogas or composting systems as alternative forms of energy. These systems will be developed with more detail in the housing and infrastructures section.

Waste prevention, or “source reduction,” is the strategy behind reducing and re-using waste. By designing, manufacturing, purchasing, or using materials in ways

that reduce the amount or the toxicity of trash created, less waste is generated and fewer natural resources are used. Reuse is often part of the waste prevention strategy, stopping waste at the source by preventing or delaying a material’s entry in the waste collection and disposal system.

An strategy of how to integrate the current informal management of services into the plan is a major challenge. In Mukuru Kwa Njenga many people have a source of income from the management of water, sanitation and electricity. Hundreds of people that should be integrated in the management of the new services system.

Water

Piped water into each plot is to be provided. Rain water harvesting methods are to be incorporated in the block designs to take advantage of natural resources with no cost and also to ensure that during the rainy season the residents have water for use.

Though water supply is provided to the plots, water kiosks still should provide water for those that decide to have no connection to the general supply, for businesses in the streets and visitors.

Water supply will need a management for the different levels, private and public, so discussions with the community should be held in order to agree about the people in charge, build capacities and provide with a source of income to those that use to have it from the water management.

Sanitation

For human waste collection and disposal, the housing designs are going to incorporate connection to the sewer lines already under construction. As the case of water supply, public toilets will be conserved and new ones built in order to provide sanitary services to the people in their day by day.

Existing public toilets but also the new ones can still be managed by the groups in place, mainly women and youth groups. There is also a strategy to provide bio-gas

to household blocks from communal bio-centers as there are four working bio-centers already in place.

For the solid waste collection and disposal there is a transfer station proposed to ensure recycling and waste reduction in the north of the settlement in Sisal. Mukuru is located on a strategic site near the industrial area where many recycling enterprises are established. This means that it has several advantages regarding promotion of a waste management chain that can be a source of income for the people of the settlement. CBOs currently working on garbage collection and environment (mainly youth groups) should organize themselves to cover the garbage collection in the area and sell it or transform it into new items, as garbage is not always waste.

Electricity

Formal electricity provision is to be incorporated to ensure safety and affordability to the people. Again, the electricity system is going to include the current management systems in place to ensure smooth transitions and sustenance of the current lives

5.5. Commercial

In regards to the commercial sector in Mukuru Kwa Njenga, the micro economy plays a very critical role as it is what majority of the people depend on as their main source of income and it is also the heart of the slum. Through the micro economy, the residents are able to provide for their families as well as to sustain themselves. In Mukuru, there are different business typologies and through this upgrading project, the project is taking into account the different typologies. In the planning process, the different typologies will be allocated adequate spaces.

Typologies

The approach that the upgrading project is going to use is to allocate separate space for the different businesses. For instance, the ground floor is to cater for permanent businesses and depending on the demand and the growing rate of the informal settlement, the second floor can also be used for businesses.

Along the roads, the businesses that are less permanent such as the kiosks will be accommodated on the same roads through a mobile structure. Also, another approach of using mobile carts can be considered especially for the mobile street vendors who need to move around with their commodities depending on the demand by customers and the kind of goods they are selling.

Currently, there is a market in Wape Wape, which is quite temporary in that it is located on space that initially was occupied by houses that were later demolished. Through the upgrading project, the market is going to be conserved and adequate space will be allocated so as to be able to cater for the businesses being offered at the market as well as to handle the human traffic. Apart from that, this will enable the mobile vendors in the market to be able to invest more in their business by expanding their stalls hence increase their customer base.

References

- CBS. (2009). *Kenya Population and Housing Census*. Nairobi: Kenya Government Printers.
- Centre for Urban Research and Innovations (2012): Mabatini Informal Settlement Upgrading Plan.
- Council, M. C. (2012). *City Council of Manchester* . Retrieved November 16 - 18, 2012, from Standards for Houses in Multiple Occupancy: <http://www.manchester.gov.uk>
- Elwefat, N. A. (2007). *Bioclimativ Architecture in Libya*. Middle East Technical University .
- GoK. (2008). *Physical Planning Standards and Guidelines* . Unpublished .
- Jacobs, J. (1962). *Death and Life of Great American Cities* . U.S: Knopf Doubleday Publishing Group.
- Lamberts, R. (2006). Bioclimatic Building .
- London Borough. (2012). Retrieved November 12-16, 2012, from Bromley, the London Borough: <http://www.bromley.gov.uk>
- MuST. (2012). *Mukuru Belt Settlement Inventory*. Unpublished .
- MuST. (2012). *Mukuru on the Move* . Unpublished .
- Newman, O. (1996). *Creating Defensive Spaces*. Policy Development and Research US.
- Schumacher, E. (2010). *Small is Beautiful, Appropriate Technologies, Globalization, 73 oil Crisis, Simple Living, Buddhist Economies and Decentralization*. Betascript Publishers.
- Taylor, N. (1998). *Urban Planning Theory Since 1945*. London: Sage Publication Limited .
- UN-HABITAT, (2009). *Interlocking Stabilised Soil Blocks. Appropriate earth technologies in Uganda*. Nairobi, Kenya: UN-Habitat.
- United Nations Industrial Development Organization, U. U. (2005). *Environment Friendly Building Material Technologies for Low Cost Housing*. Beijing, P.R.China: UNIDO.
- United Nations (2010), *The Millenium Development Goals Report 2010*. New York: United Nations
- University of Nairobi & University of California, Berkeley 2012: Colaborative Report on Mathare Zonal Plan
- Urban Design. (n.d.). Retrieved August 15, 2012, from www.urbandesign.org/



CENTER FOR URBAN RESEARCH AND INNOVATIONS (CURI)
UNIVERSITY OF NAIROBI, SCHOOL OF THE BUILT ENVIRONMENT
P. O. BOX. 30197 00100, NAIROBI, KENYA
uip@uonbi.ac.ke/curi@uonbi.ac.ke
+254-20-2711574 /2 54 722658781
www.centreforurbaninnovations.com

In collaboration with:

Akiba Mashinani Trust (AMT), Muungano Support Trust (MuST), Muungano wa wanavigigi and the Mukuru Kwa Njenga Community

