THE JINJA-KAMPALA-MPIGI CORRIDOR

PHYSICAL DEVELOPMENT PLAN

JUNE 2023

CHAPTER 3
SPATIAL DEVELOPMENT FRAMEWORK AND STRATEGY

CONTENTS

3	Spatial Development Framework and Strategies	45
3.1	Introduction	45
3.2	The Spatial Restructuring of the JKM Corridor	45
3.2.1	The Colonial Era	45
3.2.2	City-Level Spatial Restructuring in the JKM Corridor	46
3.2.3	Regional Level Spatial Restructuring in the JKM Corridor	49
3.2.4	Post-Independence 20th Century Spatial Development	52
3.2.5	Summary and Analysis	55
3.3	The JKM Corridor in the Present Day: Overview	55
3.3.1	Development Trends	55
3.3.2	A Transport Corridor with an Infrastructure Deficit	57
3.3.3	Urban Reform under Vision 2040 and the National Development Plans	57
3.4	Urbanisation, population growth and spatial development in the JKM Corridor	58
3.4.1	The JKM Corridor's Location in Africa	59
3.4.2	The JKM Corridor within Uganda	62
3.4.3	Demographic trends	65
3.4.4	Current spatial trends	69
3.4.5	Distribution of human settlement land cover	73
3.4.6	Green and Commercial Farming Areas	79
3.4.7	Transport Corridors	80
3.4.8	Urban Settlements	82
3.5	Scenarios for future population and land use in the JKM Corridor to 2030 and 2040	94
3.5.1	Description of three scenarios	94
3.5.2	Datasets Used for Scenarios	96
3.5.3	GRID3 Uganda Settlement Extents	97
3.5.4	Future Population and New Growth Drivers	97
3.6	Scenario 1: Continued Dispersion	98
3.6.1	Characteristics	98
3.6.2	Implications	99
3.7	Scenario 2 – Concentrated Development	101
3.7.1	Characteristics	101
3.7.2	Implications	104
3.8	Scenario 3 – Polycentrism	106
3.8.1	Characteristics	106
3.8.2	Implications	110
3.9	Scenario Assessment and Comparison	111
3.10	Spatial Strategies	112
3.10.1	Introduction	112
3.10.2	Alignment with other spatial and physical development plans	114

3.10.3 Spatial Concept and Land use Concept 117
3.10.4 Strengthen two metropolitan regions 121
3.10.5 Strengthen the Corridors 127
3.10.6 Grow the centres 133
3.10.7 Cluster the centers 137
3.10.8 Develop new towns and satellite cities 139

FIGURES

Figure 1: Location of the Kibuga on Mengo Hill, the seat of power of the Buganda Kingdom, relative to the township of Kampala. 46
Figure 2 (Left): 1919 Planning Scheme 'C' demarking segregated trading zones for White, Asian, and African populations. 47
Figure 3 (Right): Jinja's segregated urban zones in 1917. 47
Figure 4: The remnants of the 'green belt' used to segregate Nakasero from European settlers. 48
Figure 5: Jinja in 1930. 50
Figure 6: Survey of Roads (red) and Railways (black dotted) in Uganda in 1948, showing the Bugosa and Western railways to their full extent. 51
Figure 7: Kampala Development Plan, 1972.. 52
Figure 8: Population in Uganda's largest urban centres, 1959-2002.. 54
Figure 9: Observed urban expansion between 1989 and 2010 in Kampala and surrounding metropolitan areas. 56
Figure 10: Trans African HighWay Network 60
Figure 11: Lake Victoria Region and Northern Corridor Roads Network 61
Figure 12: JKM Regional Corridor Map 62
Figure 13: Lower-Level Administrative Areas in the JKM Corridor 63
Figure 14: JKM in Southern Uganda and Urban Areas outside its boundary 64
Figure 15: Population of towns within about one hour of JKM boundary 65
Figure 16: JKM Population 2002, 2014, 2030 and 2040 66
Figure 17: Estimates of JKM's future population 66
Figure 18: Projected Population in JKM Districts in 2030 and 2040 67
Figure 19: Population Projections to 2030 and 2040 (in '000) 68
Figure 20: Definition of built-up areas, small settlements, and hamlets 69
Figure 21: Urban expansion in JKM 1990-2018 71
Figure 22: JKM Built-up areas in 2018 by relative density 72
Figure 23: Density of human settlements by Subcounty 74
Figure 24: Built-up area (BUA-1), Growth subregions, Growth areas 75
Figure 25: Small settlement and hamlet density in JKM 77
Figure 26: Built-up Area in and around GKMA 78
Figure 27: Built-up Area in and around JGS 79
Figure 28: Green Areas and Commercial Farms. 80
Figure 29: The most important corridors 80
Figure 30: Existing Transport Corridors in JKM 81
Figure 31: Detail from UNRA national expressway plan to 2070 82
Figure 32: City and Town Centres 83
Figure 33: List of Urban Settlements in JKM 84
Figure 34: Hierarchy of urban centers 86
Figure 35: City/Town Scale Growth and Activity Centres 88
Figure 36: Local Growth and Activity Centres in Jinja 89
Figure 37: Local Activity Centres in Kampala Core 90
Figure 38: Areas with Industrial and Commercial Places (OSM) 91

Figure 39: Clusters of firms by type and size 93
Figure 40: Three Scenarios for JKM in 2040 95
Figure 41: Dimensions of regional form 96
Figure 42: Building Footprints at different scales 97
Figure 43: Scenario 1 – Dispersion - JKM Corridor Dispersion at 2040 98
Figure 44: Time series of built-up area growth 99
Figure 45: Scenario 2 – Concentration - JKM Corridor at 2040 102
Figure 46: Time series of built-up area growth 103
Figure 47: Scenario 3 – Polycentrism – in JKM Corridor 106
Figure 48: Comparison of Scenarios 112
Figure 49: Selected NPDP maps 114
Figure 50: Selected KPDP maps 115
Figure 51: Selected WPDP Maps 116
Figure 52: Jinja Model Town Report 117
Figure 53: Spatial Strategy Concept 119
Figure 54: Land use concept 120
Figure 55: Two metropolitan regions in JKM 123
Figure 56: Kampala Metropolitan Region 124
Figure 57: Kampala Metropolitan Region and GKMA 125
Figure 58: Jinja Metropolitan Region 127
Figure 59: What is Ribbon Development 127
Figure 60: Kampala-Jinja Transport Corridor 128
Figure 61: Kampala-Mpigi Corridor 130
Figure 62: Kampala-Jinja Corridor 132
Figure 63: Public transport services 136
Figure 64: Map of Potential Clusters of Centers 138
Figure 65: Potential clusters of centers 139
Figure 66: Maps of Proposed Satellite Towns 139

3 Spatial Development Framework and Strategies

3.1 Introduction

The spatial development framework in this chapter, and the strategies which follow, are the heart of the JKM Corridor Physical Plan, and serve to position further sectoral strategies and recommended investments. Like all spatial frameworks, such strategies and proposals for investment must acknowledge and build on a longer-run spatial development trajectory – and provide guidance on the necessary shifts and changes required to achieve a plan's vision and goals. The chapter thus begins with a depiction of the historical development of the JKM Corridor (henceforth 'the Corridor'), to situate our evidence on its present spatial dynamics and characteristics. The analysis is presented chronologically, divided into the pre-and post-independence periods. This structure is chosen because of evidence that the planning priorities of the colonial regime in Uganda lay the foundations for Uganda's contemporary spatial structures.

3.2 The Spatial Restructuring of the JKM Corridor

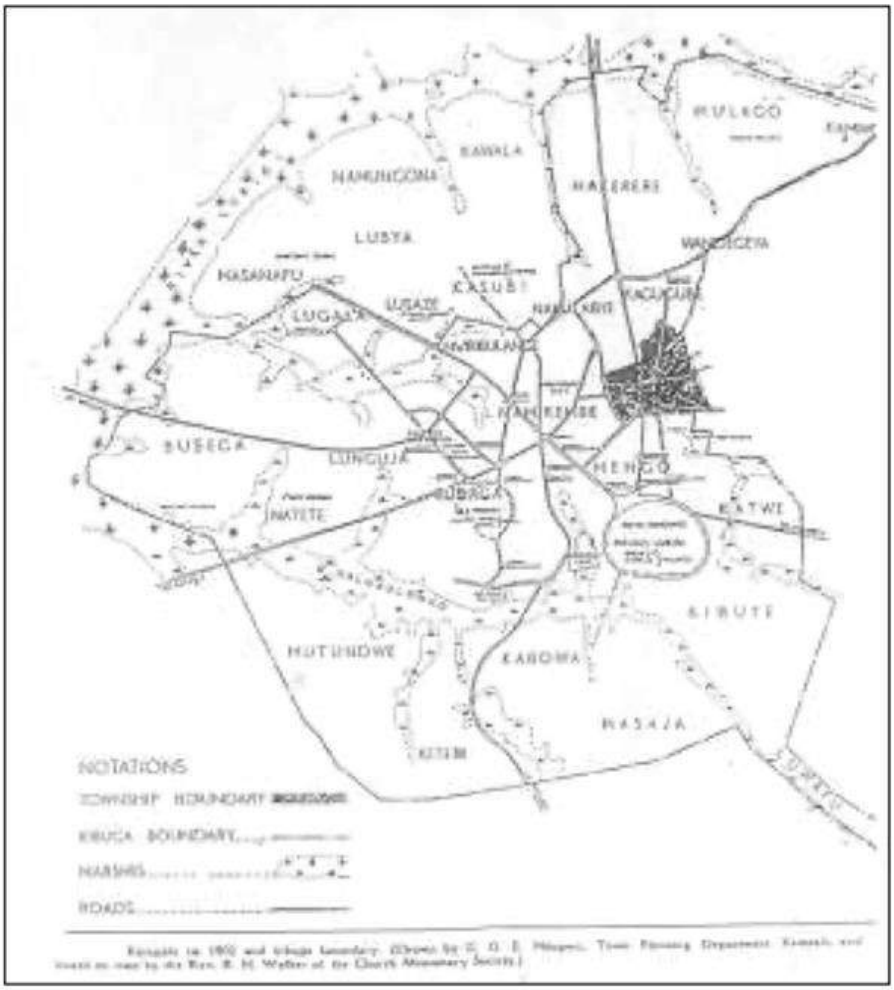
3.2.1 The Colonial Era

The annexation of African kingdoms into the Uganda Protectorate by the British Empire in 1894, followed by the declaration of the 1903 Town Planning Ordinance, began a period of significant spatial restructuring predominantly centred around areas that comprise the JKM Corridor.

Entebbe and Jinja, among other towns, were founded by colonial authorities to serve as administrative regional capitals, with Entebbe serving as the capital of the Protectorate as a whole. In some cases where an urban area existed prior to colonial incorporation, notably Kampala, significant spatial and administrative restructuring was undertaken to incorporate existing urban areas into colonial administrative structures.[1]

[1] P. Mukwaya and S. Lwasa (2010). 'Urban Development Transitions and Their Implications for Policy Planning in Uganda' in *Urban Forum* (21:3).

Figure 1: Location of the Kibuga on Mengo Hill, the seat of power of the Buganda Kingdom, relative to the township of Kampala.



Source: F. Omolo-Okalebo, 2010.[2]

The Uganda Protectorate saw spatial restructuring in common with other British imperial holdings, wherein the creation and implementation of spatial and strategic plans would serve two principal functions: (i) on the city level, to enforce colonial social structures, and (ii) on the regional level, to integrate the Protectorate into Imperial economic value chains. Both have had long-term implications for the spatial development of the Corridor.

3.2.2 City-Level Spatial Restructuring in the JKM Corridor

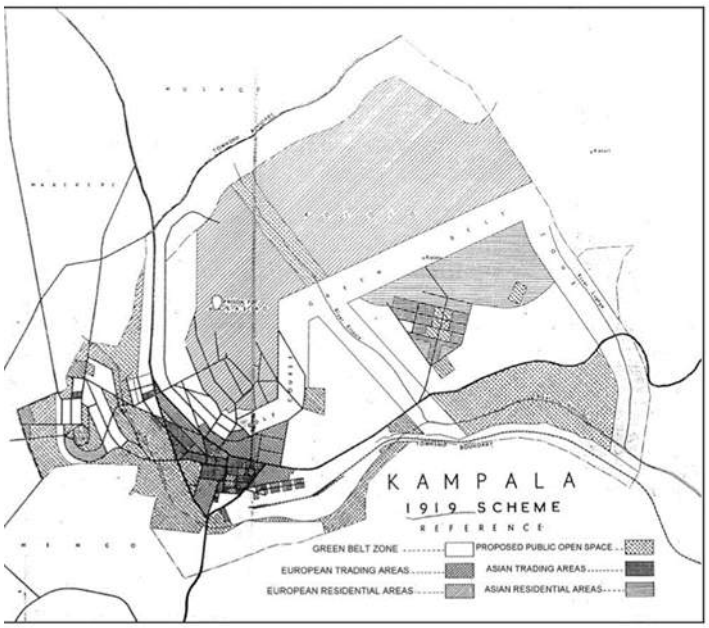
On the one hand, physical and spatial plans served to enforce colonial social structures at the city level. This involved the hierarchical spatial segregation of African, Asian, and European communities, which laid the foundation of a pattern of spatial development still seen today. Spatial segregation of social groups as an aim of spatial planning can clearly be seen in the 1919 Kampala Development Scheme. (Figure 1),

[2] F. Omolo-Okalebo (2010). 'Two Cities in One:
The Genesis, Planning and Transformation of Kampala City 1900-1968 '

devised by William J Simpson on the invitation of the Town Planning Committee of the Uganda Protectorate:[3]

Figure 2 (Left): 1919 Planning Scheme 'C' demarking segregated trading zones for White, Asian, and African populations.

Figure 3 (Right): Jinja's segregated urban zones in 1917.



Source: F. Omolo Okalebo, 2011

Source: A. Wako and M. Olweny, 2019 [4]

Simpson's recommendations for segregation along racial lines were not limited to Kampala but were proscribed for every town and city in Uganda under the Protectorate. This was clearly visible in Jinja's development (See: Figure 3).[5]

Colonial spatial planning was underpinned by a combination of ideas popular in urban planning in Great Britain at the time, namely the 'Garden City' concept, as well as emerging ideas correlating then-contemporary understandings of public health to spatial planning practices. The key features of this approach to spatial planning in Uganda were: [6]

- Prioritising the settlement of highlands;

[3] F. Omolo-Okalebo (2011). *Evolution of Town Planning Ideas, Plans, and their Implementation in Kampala City, 1903-2004.* CEDAT, Kampala.

[4] A. Wako and M. Olweny (2019). 'Historical Study of Jinja, Uganda: A City Influenced by Industrial Developments During the Early 20th Century', in *The Built Environment* 191.

[5] Ibid. It should be noted that in Kampala, this segregation was particularly complex, as the European settlement founded in 1902 was established *alongside* the Kibuga and the relatively administratively autonomous Kingdom of Buganda.

[6] Ibid, further supported by broader overviews of British colonial spatial planning practices. See, for example, C. Silva (2013). 'Colonial Architecture and Urbanisation in Africa: Intertwined and Contested Histories', in *Planning Perspectives* 28:1, pp. 156-159.

- Ensuring low-population densities by building dispersed, low-rise neighbourhoods of individual housing units (as opposed to terraces or apartments);

- Providing clean, public piped water as a matter of priority.

These principles became predominant in physical plans throughout the colonial period, resulting in a clear distinction between spaces demarked for White, Asian and African populations. White neighbourhoods were well endowed with features such as tree-lined paved roads supporting well-serviced, detached and spread-out individual houses. Such neighbourhoods tended to displace hill-top communities, with African communities relegated to low-lands that were wrongly believed to be at greater risk of disease outbreaks.

Formal planning and subsequent plan implementation were reserved for White communities, with African communities being allocated neither the resources required for such planning nor the means of procuring said resources for themselves. They were further often segregated from white populations by a literal barrier of undeveloped green space. The result was a stratification of settlements ranging from highly regulated, wealthy communities of Europeans occupying hills, down to pre-existing settlements that had effectively been rendered unauthorised and informal.[7] As can be seen in Figure 3, the physical scars of this segregation still exist today, with the pattern of low-density, wealthy, and formally planned hilltop communities clearly contrasted against denser settlements:

Figure 4: The remnants of the 'green belt' used to segregate Nakasero from European settlers.

Source: F. Omolo Okalebo, 2011

[7] IPE Triple Line (2018). *Spatial Inequality in Times of Urban Transition. Spatial Assessment of Kampala, Uganda*.

This spatial segregation underpinned a stratified labour market that drove a 'core-periphery' spatial development pattern.[8] Towns and cities such as Entebbe, Jinja and Kampala were carefully planned with building regulations enforced and taxes collected, while African settlements were left unplanned with no means of collecting tax income. This led to an uneven distribution of infrastructures that prioritised areas of colonial administrative and industrial significance.

This two-tier treatment of urban planning contributed to the groundwork for the proliferation of informal settlements in the JKM Corridor, as put by Mukwaya et al.:

> *"Possibly one could argue that this [implementation of segregated planning] is one reason for the growth of informal settlements in Ugandan towns, because the colonial administrator was preoccupied with providing for the urban needs of his own class, and subsequent planning systems have failed to find solutions to the problems [this] presented."* [9]

3.2.3 Regional Level Spatial Restructuring in the JKM Corridor

The foundation of towns and cities in Uganda for colonial administrative purposes led to a spate of town planning and infrastructure development that cemented what is now the JKM Corridor as a cohesive regional unit. The JKM Corridor saw a number of new towns founded owing to their proximity to Lake Victoria, which in the early 20th Century carried the entirety of Uganda's exported goods via steamer. Entebbe and Jinja were the principal nodes through which exports from the Protectorate were connected via steamer to the Uganda Railway, which stretched from Mombasa to Kisumu in modern-day Kenya (and not, as one might assume from its namesake, through the Protectorate of Uganda).[10] Kampala was also served by steamers, initially via Munyonyo and later via Port Bell. These steamer services were the beginning of the JKM's status as a transport corridor.

This concentration of steamer-service infrastructure to serve Uganda's emerging export economy led to a cascading of further infrastructure developments. The first railway in Uganda was constructed in 1912 between Jinja northwards to Namasagali, a total of 61 miles, to connect Lake Victoria to the Lake Kyoga basin via Kakindu. This was further extended seven miles to Namasagali in 1914, and extensive road networks were constructed to facilitate the establishment of cash-crop-exporting industries. Six miles of railway were constructed between Port Bell and Kampala in 1913.[11]

The Busoga railway led to Jinja's rise as an industrial centre for the country, further intensified as a node for export freight through the construction of the railway connecting Mbulamuti and Tororo to the Kisumu-Mombasa line in 1928.[12] This was strengthened by the completion of a rail link between Jinja and Kampala in 1931. This extension of railway services in proximity to the Busoga Railway led to a significant decline of steamer freight in the region.[13]

---

[8] S. Beckert (2015). *Empire of Cotton: A New History of Global Capitalism*. Penguin Books, London.

[9] P. Mukwaya and S. Lwasa (2010), p. 7.

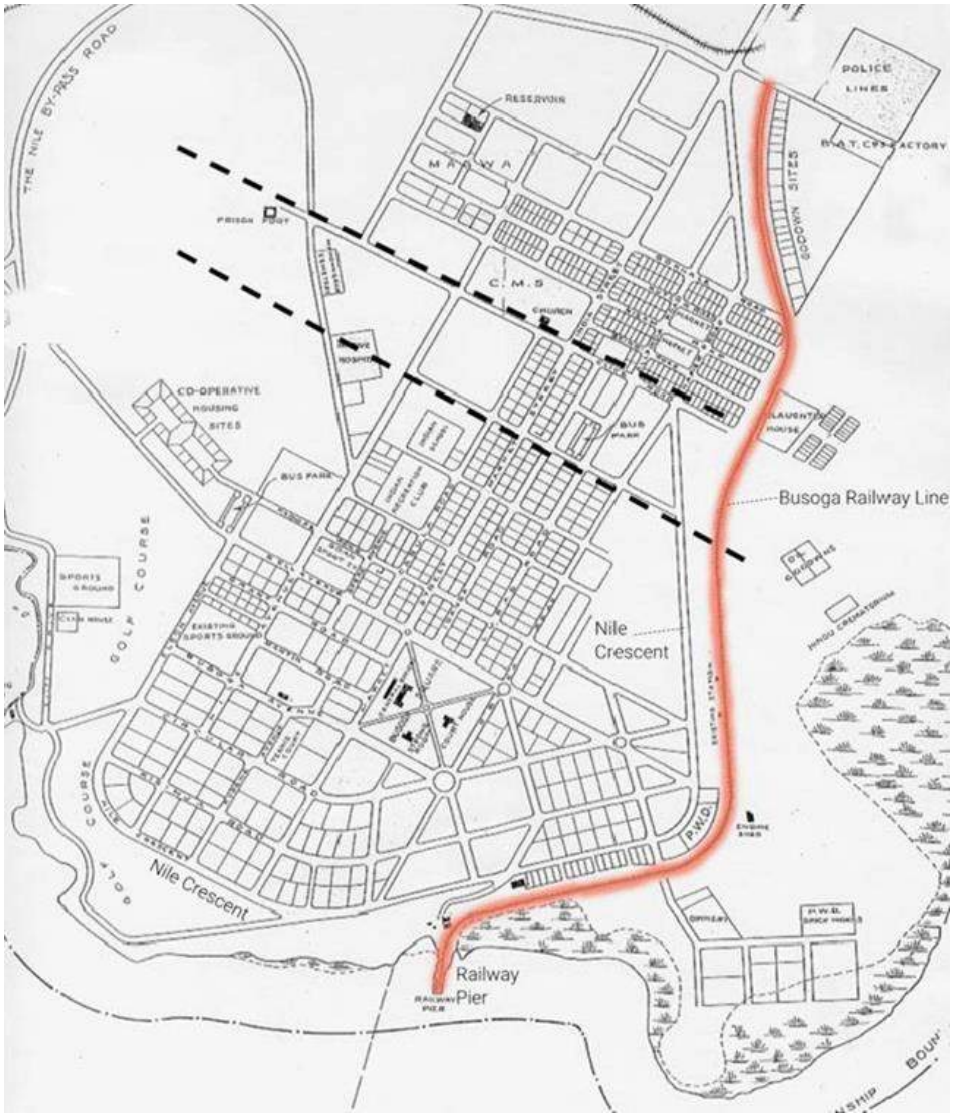
[10] A. M. O'Connor (1965). *Railways and Development in Uganda: A Study in Economic Geography*. Oxford University Press, Oxford.

[11] Ibid.

[12] Ibid.

[13] A. Wako and M. Olweny (2019). 'Historical Study of Jinja, Uganda: A City Influenced by Industrial Developments During the Early 20th Century', in *The Built Environment* 191.

Figure 5: Jinja in 1930.



Source: A. Wako and M. Olweny, 2019

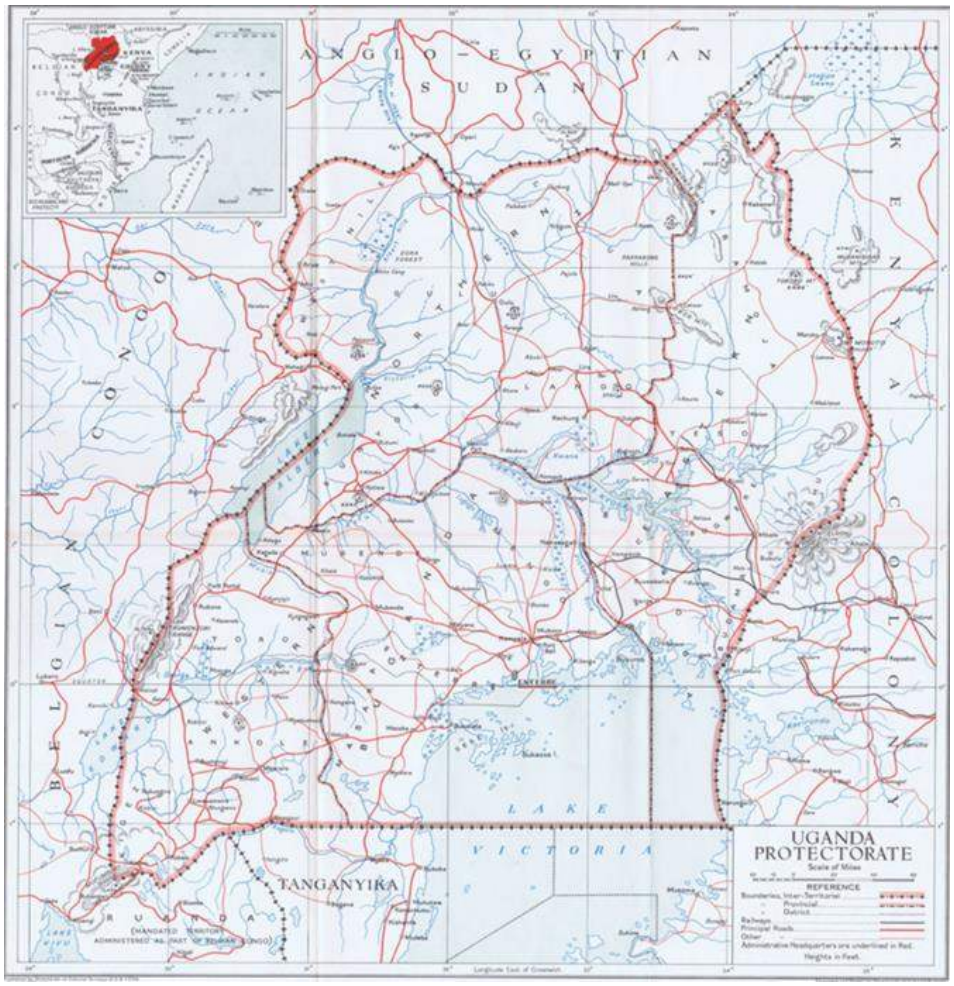
By the end of the 1940s, what is today the JKM Corridor had emerged as a transport corridor, principally connecting cash crop farming in Uganda's hinterland to Kampala and Jinja, for export via the Uganda Railway and Lake Victoria steamer freight (See: Figure 6). This had the impact of dramatically pivoting the economic centre of Uganda towards what is today the JKM Corridor and its neighbouring northern provinces, with the corridor being restructured by colonial authorities to serve as a transport corridor for the Protectorate's exports.

Due to the corridor's primacy in political administration and infrastructural development of the Ugandan Protectorate, the region experienced rapid population growth spurred by in-migration from other parts of Uganda and the wider Empire, as well as increasing natural population growth. The corridor area was strategically poised to be the seat of industrialisation investment during the interwar period (1918-1940) onwards, owing to its status as the principal node between the Protectorate and the wider Empire. The interwar period saw the development of agricultural processing activities such as ginning, coffee curing, and sugar milling, with raw materials drawn from the immediate and wider agricultural land across Uganda. This would eventually lead to Kampala becoming a municipality in 1944, with the city at the

centre of a 40km stretch of railway that served as the principal artery for the Protectorate's imports and exports.[14]

The post-war period further saw the intensification of major infrastructural and industrialisation projects. In 1951 the expansion of the Entebbe international airport and the Nalubaale (then, *Owens*) Fall Dam and Hydroelectric Power Plant in Jinja were completed.[15] Later, in 1956, a 208-mile westward extension of rail services connecting Kampala to Kasese was completed, and in 1961 the Jinja-Bukonte railway was established to compensate for the poor state of the Jinja-Tororo line.[16]

Figure 6: Survey of Roads (red) and Railways (black dotted) in Uganda in 1948, showing the Bugosa and Western railways to their full extent.



Source: UK War Office, 1948

Despite Kampala and Entebbe's significance as administrative capitals and infrastructural nodes, a lack of suitable and available land for industrial development led to Jinja becoming the principle focus for industrialisation under the post-war colonial industrialisation policies, which emphasised "dollar earning" and "dollar saving" industries to support imperial economic needs. Jinja saw the development of some 50

[14] M. Obwona et al. (2016). 'The Evolution of Industry in Uganda', in *Learning to Compete Working Paper 9*. Brookings Institute, Washington.

[15] Ibid.

[16] M. O'Connor (1965).

industrial plants, separated into two distinct estates on either side of the Nile River. The town was subsequently incorporated as a municipality in 1956.[17]

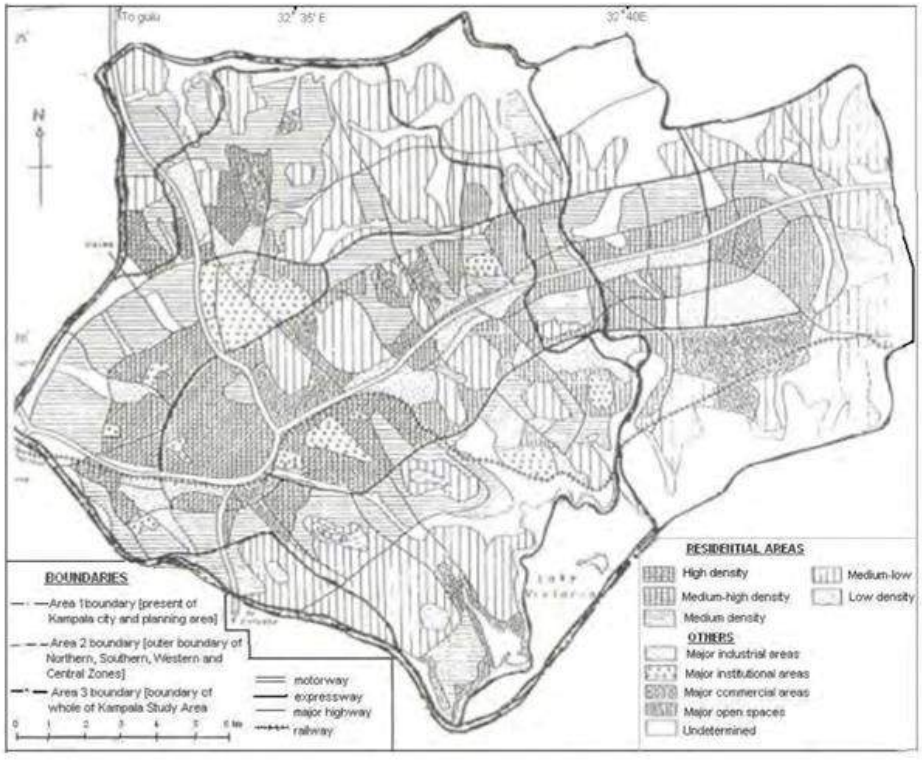
The colonial period of spatial restructuring, therefore, can be seen as the genesis for the JKM corridor's primacy in Uganda's economic development, with the colonial authorities' pursuit of economic efficiency towards imperial needs leading to a concentration of physical planning, economic investment, infrastructural development in the region, followed by a subsequent growth in the population of the JKM Corridor that outstripped other regions in Uganda.

3.2.4 Post-Independence 20th Century Spatial Development

Uganda inherited infrastructures, planning instruments, and existing spatial developments geared towards colonial interests from the preceding Protectorate when it declared independence in 1962. Subsequently, significant changes to urban planning and master planning were adopted, including:[18]

- Establishing Kampala as the principal site of development for commercial, institutional and residential use along with light industry only, so as not to compete with Jinja;
- Redrawing of boundaries for districts, particularly district centres, to make land accessible for development and avoid overwhelming the capital;
- Preparing long-range master plans for water and sanitation in all towns.

Figure 7: Kampala Development Plan, 1972..



Source: F. Omolo-Okalebo 2011

[17] B.S. Hoyle (1963). 'The Economic Expansion of Jinja, Uganda', in *Geographical Review* 53:3.

[18] P. Mukwaya and S. Lwasa (2010)

These priorities were reflected in the 1972 Kampala Development Plan (Figure 7). But owing to the political instability and subsequent economic collapse after independence, such plans were not implemented. Urban centres in the JKM corridor lacked the municipal and economic capacity to support their growing populations, leading to a deterioration of existing infrastructure.

Further, as an inadvertent result of the 'Enabling Policy', intended to ensure housing in urban areas via state housing projects, private sector house prices skyrocketed while public housing was built far from urban centres. With in-migration and accelerating natural population growth leading to a rapidly expanding urban population in the corridor, a growing number of the urban poor were forced to establish unplanned settlements close to downtown areas and along waterways.[19] Because of these conditions, this period saw rapid, uncontrolled expansion of Kampala driven predominantly by informal settlements and economic activities, eclipsing the former capital of Entebbe and other significant municipal centres in the corridor.

Kampala's expansion was coupled with the rapid expansion of very small towns, and the decline of larger urban centres such as Jinja. Jinja's population grew at a rapid annual rate of 5.8 percent between 1959 and 1968 but fell by 0.7 percent between 1969 and 1980.[20] Meanwhile, some small towns such as Busia, and Buikwe District, grew by a remarkable 21.2 percent per year in the same period. Jinja's decline can be attributed to the political instability of the post-independence period, with its industrial base nearly eliminated in its entirety by the end of the 1980s.[21] Conversely, the expansion of small towns can be attributed to the expanding relative importance of the JKM Corridor during this period of economic decline. As Edward Mugami framed it,

> "*It is the smaller [towns], particularly in the south, that much of the African enterprise developed… elsewhere in the country, [towns] have developed more as district administration centres… these [southern towns] act as local markets or collecting points of local farms destined for consumption with the region which they are situated. They also act as collection centres for exported produce*." [22]

Between 1962 and 1985, the JKM Corridor, therefore, witnessed a second spatial restructuring, wherein Kampala became the predominant urban spatial area of the JKM corridor, and of Uganda more widely, owing to its status as the capital city; investment in light industrial activities and zones; and its centrality in the infrastructural links that connected it to international trade routes. Yet, economic decline meant that the country remained largely unurbanized, which in turn fuelled the simultaneous growth of small rural towns in the region alongside the stagnation of secondary urban centres such as Jinja and Entebbe.

The advent of the National Resistance Movement (NRM) in 1985 marked a revival of some active spatial development efforts, however, these efforts were undermined by a weakening of institutions responsible for enforcing building codes and spatial plans. Uganda underwent a contested economic and political restructuring and a subsequent, tentative revival of the national economy driven by decentralisation and a *laissez-faire* approach to urban development.

Some of the proposals in the 1972 Development Plan, notably the provision of land for light-industrial estates in Kampala, were gradually put into place, though this development was limited to the capital.

---

[19] Ibid.; see also, IPE Triple Line (2018).

[20] E. Mugabi (1985). *DPU Working Paper – No. 39. The Development of Towns in Uganda, 1970-1980.* University College London, London.

[21] Ibid.

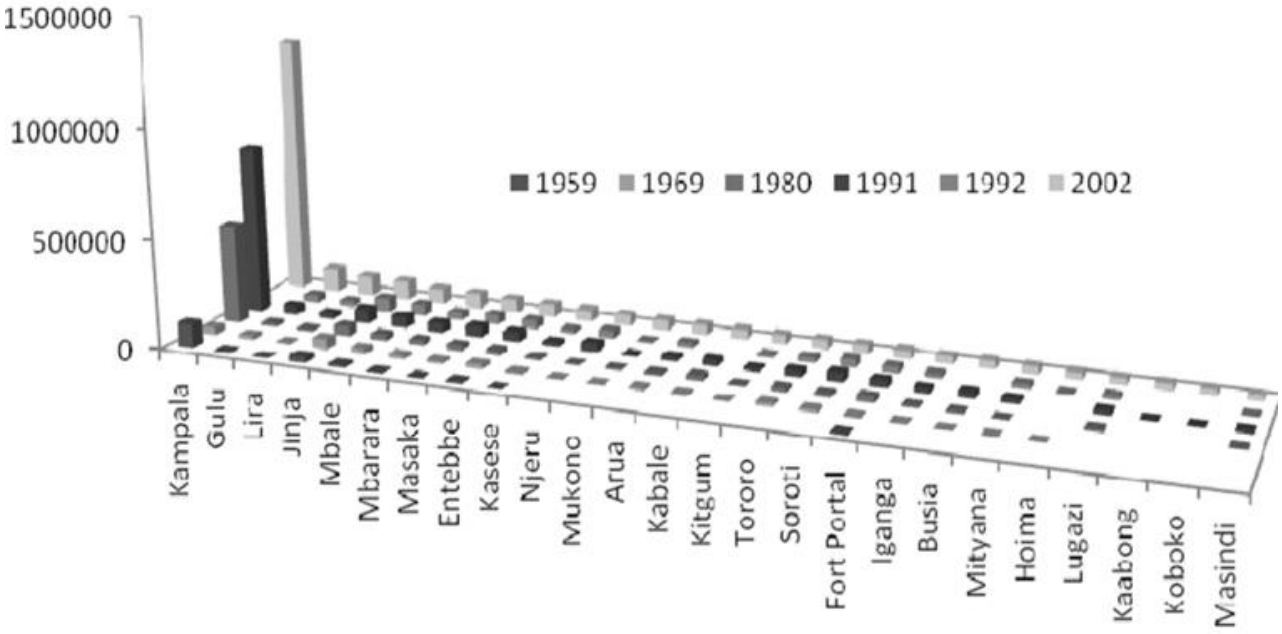
[22] Ibid. p. 18.

While economic growth between 1985 and 2000 averaged approximately 5.6 percent per annum, this growth was inequitable, with poverty sharply increasing. As such, unplanned development accelerated to accommodate the growing population of urban poor, including the arterial transport networks in the JKM corridor and particularly between Kampala and Entebbe International Airport.

Ultimately, however, infrastructure was allowed to fall into disrepair and, with a lack of capacity to implement plans, the JKM corridor's spatial development post-independence can be seen as largely uncontrolled and informal. Immediately after independence, controlled spatial development was prioritised, but a lack of capacity meant these visions could not be implemented; after 1985, capacities were improving, but a laissez-faire approach to urban development meant that controlled developments were largely restricted to freeing up land in Kampala for light industry, and the development of major infrastructure for integration into the Northern Corridor.[23]

While urban centres such as Jinja and Entebbe went into relative decline, the primacy of the corridor's significance in Uganda was strengthened in this period, as spatial development of Kampala and its surrounding infrastructure was prioritised. Likewise, this period saw exponential growth of Kampala to dwarf other population centres not only in the corridor but across all of Uganda.

Figure 8: Population in Uganda's largest urban centres, 1959-2002..



Source: P. Mukwaya 2010

By 2002, Kampala's population rose to nearly 1.20 million, and its land coverage expanded hugely from 98 sqkm in 1965 to 895 sqkm in 2002.[24] Post-independence development in the JKM corridor was typically informal and unplanned, with urban centres growing in a patchwork of under-serviced, poorly connected settlements.[25]

[23] P. Mukwaya and S. Lwasa (2010)

[24] Ibid.

[25] IPE Triple Line (2018).

3.2.5 Summary and Analysis

As the account above demonstrates, the administrative boundaries, politics, and spatial form of the Corridor have often frequently undergone dramatic and disruptive changes over the past 120 years, but its core function as a transport corridor has remained. The recognition of the corridor as a cohesive territorial entity is a novel development, but one that recognises the long-standing spatial function of the corridor.

What can be seen in Uganda's historical development is that the JKM Corridor has always existed in some form as a critical transport corridor within the country. Under the colonial administration, new urban areas were established, and modern infrastructure was laid down to connect Entebbe, Kampala, Jinja and their satellite urban areas to wider colonial supply chains via Kenya out towards the Indian Ocean. From the 1970s onwards, the Corridor's relatively even 'core and periphery' spatial development, centred around Jinja, Entebbe, and Kampala, saw an exponential shift towards Kampala's economic and political primacy, with rapid population growth driving the city's urban conglomeration to eclipse other urban areas. While the turn of the millennium has seen the continued expansion of Kampala into neighbouring districts, particularly Wakiso, it has also seen a resurgence of Jinja and Entebbe as significant urban nodes. Nevertheless, spatial growth in this period was characterised by (i) informal, unplanned spatial development, and (ii) the integration of Kampala, Entebbe, Jinja, Mpigi and the fringes of the JKM Corridor into the Northern Corridor.

To a large extent, urban development has occurred in an unplanned way that has seen exponential growth of Kampala as the primate city in the region. The result is that a transport corridor does indeed exist in the region – it is, however, a 'patchwork' of at times disconnected infrastructure, built from the spine of inherited infrastructure constructed in the colonial era. The challenge, therefore, of developing the JKM Corridor is not the development of these infrastructures into a transport corridor, for this has always existed in the region – rather, the challenge is pivoting from a patchwork transport corridor into a fully-fledged development corridor.

The conclusion that the JKM Corridor has always existed in some form as a transport corridor is salient because it underscores that the recent adoption of the terms 'transport corridor' in the Ugandan Government's spatial development approach is not a radical departure from the past.

3.3 The JKM Corridor in the Present Day: Overview

3.3.1 Development Trends

Uganda's urbanisation has accelerated profoundly in the 21st Century. Between 2005 and 2010 alone, the country's total built-up area grew ten-fold, and by 2010 over 19 percent of the country's population lived in urban settlements. Annual urbanisation rates have increased at an average of approximately 5 percent per year up to 2019.[26] Urbanisation has played a key role in increasing Uganda's productivity, with a shift away from subsistence agriculture to formal and informal jobs in cities – yet, this urbanisation is still at a relatively early stage, with 72 percent of Uganda's population still working in subsistence agriculture.[27] Urbanisation has occurred in a manner consistent with the trends of rapid, unplanned and uncoordinated growth outlined above.

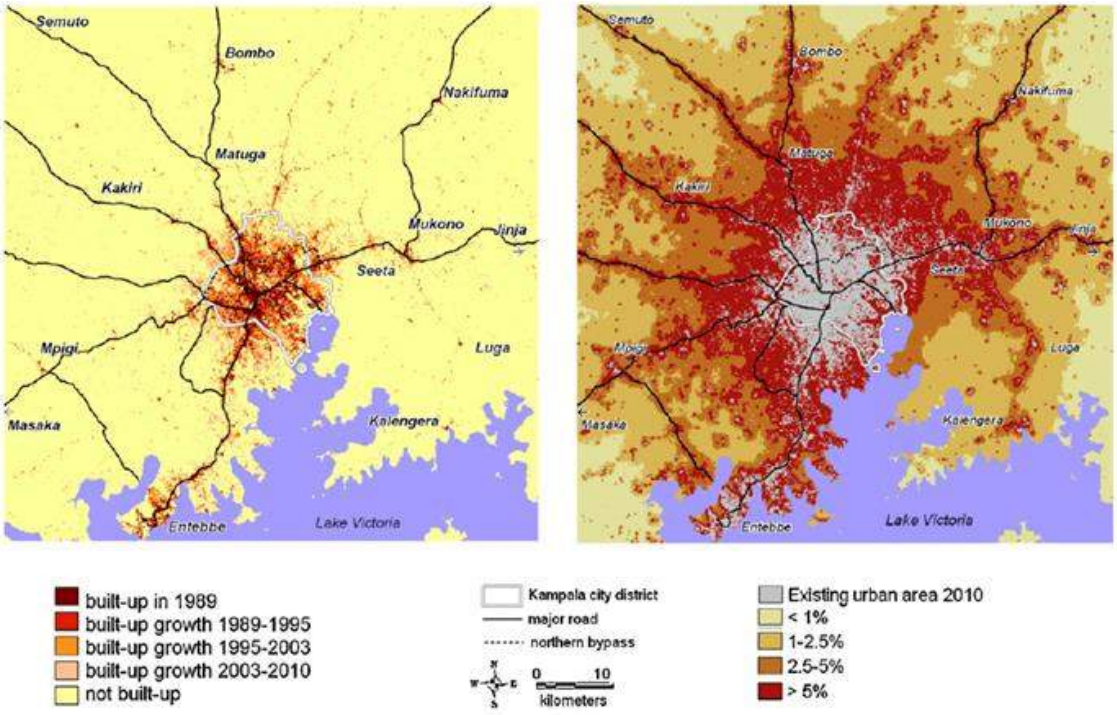
[26] ARUP (2016). *Future Proofing Cities. Uganda – Secondary Cities*. ARUP, London.
[27] ARUP (2016).

Kampala's primacy as the centre of urban development in the country remains, but the growth of secondary cities is accelerating at a faster pace than that of the capital. Within the corridor, Kampala eclipses other urban areas in terms of its population, economic output, and land coverage, as seen in Figure 9.

However, largely as a result of Kampala's massive growth, congestion and effective saturation as an urban centre, other areas of the corridor have also emerged as key growth areas. Outside of key urban centres, a clear pattern of spatial development tracks the infrastructural linkages of the corridor. Wakiso District has seen rapid spatial development in areas bordering the GKMA, as well as along the road and rail linkages between Kampala and Lake Victoria, and between the city and Entebbe International Airport.

The spatial forms of the JKM Corridor's growth can be described as occurring in a 'dispersed' manner consistent with many sub-Saharan African cities – this refers to low-rise, sprawling urban areas with 'infilling' occurring in a multiplicity of urban 'cores' within the urban footprint. Most growth has occurred along the main arterial infrastructural routes, namely highways, radiating out of Kampala:

Figure 9: Observed urban expansion between 1989 and 2010 in Kampala and surrounding metropolitan areas.



Source: K. Vermeiren and K. Leuven (2012)

With urban population expansion far outstripping the capacities of local governments to implement plans, by 2007 some 60 percent of the urban population in Kampala lived in informal settlements.[28] Further, with Kampala saturated in terms of room available to expand, the JKM Corridor has seen significant growth along its key infrastructure, particularly the links between Kampala-Entebbe and Kampala-Jinja.

As a result, the JKM Corridor is a transport corridor facing significant pressures to serve two functions: on the one hand, serving as the principal node through which Uganda's economic output is produced and

[28] Ibid.

connected to the wider world, and on the other, supporting the lives and needs of rapidly expanding informal (and to a lesser extent, formal) settlements and their residents which are dependent on its infrastructures.

3.3.2 A Transport Corridor with an Infrastructure Deficit

Today, as it has done since the beginning of the 20th Century, the JKM Corridor has all the characteristics of a transport corridor. Spanning from west to east, the Mpigi to Jinja road route of some 120km forms its infrastructural spine, which combines Greater Kampala with Buikwe and Jinja. From this core, the transport corridor extends a wider network connecting Masaka and Mbale, which further constitutes a major industrial corridor. This corridor is, in turn, a key node on the 2,100km Northern Corridor, linking Uganda with the DRC, Rwanda, and Kenya out towards the port of Mombasa.

While infrastructure investment is estimated to have contributed to 1.5 percent of Uganda's annual economic growth each year, it is largely failing to deliver significant productivity advantages, a common thread seen in African cities.[29] [30] Transport and municipal infrastructure are often in poor condition and have low coverage. As growth has largely been concentrated in Kampala and its surrounding districts, the multi-nodal sub-corridors within the JKM Corridor are underused. As a result, Kampala is suffering from taking a disproportionate burden of infrastructure demands, which in turn has led to significant constraints on the efficacy of its infrastructure. One key issue that has emerged is traffic congestion.

In addition to failing to meet the commercial and industrial needs of residents, what is a patchwork of infrastructure fails to serve residents of the JKM Corridor. People living in informal settlements find themselves caught between dysfunctional informal infrastructures on the one hand, such as patchy, dense networks of narrow roads and poor connections to water and electricity grids. On the other, they find themselves at the mercy of sporadic and unpredictable enforcement of building and planning regulations, resulting in displacement and disruption to their livelihoods.[31]

Despite its status as a transport corridor, the JKM Corridor is thus suffering from significant infrastructure deficits. A key priority for the development of the Corridor must therefore be a strategic investment to better leverage the existing nodes within it, spreading the pressures of urbanisation away from the core of Kampala, and towards a more even distribution of development towards other, existing nodes. Fortunately, the JKM Corridor is well poised to make effective use of its inherited infrastructure to serve as points of potential investment and development to this end.

3.3.3 Urban Reform under Vision 2040 and the National Development Plans

In recognition of the increasing precedence of urban planning issues in Uganda's development challenges and coinciding with international trends recognising that urbanisation is one of the key challenges of the 21st Century globally, the Ugandan government published its long-term strategic development strategy

[29] Presentation delivered by Julia Bird and Ferdinand Raunch (2015). *The Effects of Traffic on Firm Location*.
[30] R. Ranganathan, V. Foster (2012). *Uganda's Infrastructure: A Continental Perspective, World Bank Policy Research Working Paper 5963*
[31] C. Macfarlane and J. Silver (2017). 'Navigating the City: Dialectics of Everyday Urbanism', in *Transactions of the Institute of British Geographers* pp. 457-471 (42:3)

Vision 2040.[32] Within its quantified development targets are aspirations with a squarely urban focus, including:

- Increasing the share of people living in planned settlements to 100 percent in both rural and urban areas;
- Increasing the share of standardised paved roads from 4 percent to 80 percent;
- Improving access to key infrastructures including electricity, piped water and housing.

These priorities are supported by short-medium-term national strategic plans, the National Development Plans, first introduced in 2010.[33] NDP III recognises the need for greater prioritisation of state-led urban development interventions, not only in the form of commitments to master planning but in the form of robust interventions to the planning system itself.

Proposed interventions under NDP III towards the achievement of the goals set out under Vision 2040 include rationalising the system of land tenure and providing more resources to local administrations responsible for producing and implementing spatial plans. Such changes shall go far to address what UN-Habitat has recognised as the principal inhibiting factor (alongside a lack of local government capacities) for guiding spatial expansion in the corridor.[34]

Crucially, NDP III recognises the importance of adopting a multi-polar approach to development. By reprioritising urban planning and urban development initiatives, the Ugandan government has succeeded in the progress of new and old urban interventions, including the completion of the 15km Kampala Northern Bypass Highway in 2009, an upgrade of the Northern Corridor transport route, and the proposed Kampala-Jinja Expressway, a four-lane toll-highway expected to be completed in 2026.

This indicates a positive trend towards leveraging Uganda's urban development to encourage equitable and sustainable growth and a recognition of the underlying infrastructural deficit that is both a result of and reinforces an underutilisation of existing sub-corridors. Uganda has adopted a clear strategic direction, and the increasingly holistic and well-considered nature of each progressive NDP is evidence that this strategy is evolving based on lessons learned.

3.4 Urbanisation, population growth and spatial development in the JKM Corridor

This section sets out the evidence base upon which the JKM Corridor spatial strategy is founded, detailing and analysing the existing demographic and spatial structure, progressing from the large scale to the local scale. We start with a brief description of Uganda's location in Africa, within a large and urbanising Lake Victoria Region, landlocked but linked through a Trans-African Highway that is simultaneously the

[32] Reviewed extensively in Working Paper 1 of this project. Vision 2040 Available online at: http://www.npa.go.ug/uganda-vision-2040/

[33] Reviewed extensively in Working Paper 1 of this project. NDP's I, II, and III available online at: http://www.npa.go.ug/development-plans/national-development-plan-ndp/

[34] UN HABITAT (2006). *Situation Analysis and Action Plan of Kinawataka and Kagugube Slum Settlements in Uganda.* UN-HABITAT, Nairobi.

JKM Corridor's critically important central spine. We then show JKM's regional context, with several sizable urban centres within an hour of its boundary.

Based on analyses of the extent or distribution of its human settlements, we describe the existing overall spatial structure and emerging urban forms. Similarly, we identify road corridors linking the settlements that will be targeted for potential economic development strategy. Related to this, we identify the activity centres at multiple scales, that may become the growth points.

We analyse the coverage of the green and commercial farming areas, which will constrain or otherwise impact future growth and spatial expansion. Finally, as a lead into the next section, we present the evidence of urban expansion in the corridor, which is the main driver behind the need to prepare alternative growth scenarios.

3.4.1 The JKM Corridor's Location in Africa

The JKM Corridor's location in Africa — bordering Lake Victoria, on the Northern Corridor, which is part of the Trans-African Highway Network — provides important opportunities to be exploited in planning for the future.

Trans-African Highway

Landlocked Uganda is connected to the rest of Africa by the Trans-African Highway (TAH), seen in Figure 10 below, of which TAH 8, the east-west Lagos-Mombasa Highway, forms the central spine of the JKM Corridor. TAH 8 runs east through Nairobi, with some 10 million people, to Mombasa, with some 3.5 million and home to Uganda's closest port. At Nairobi, the TAH 8 connects to TAH 4, the north-south Cairo-Gaborone Highway, which connects to Addis Ababa (with 5 million), Khartoum-Omdurman (7.5 million) and Greater Cairo (20 million). TAH 8 also runs westward to West Africa (Bangui, Yaoundé and Lagos, Accra and Abidjan), and will become an important corridor when the highway is completely paved.

Figure 10: Trans African HighWay Network

Source: R. Parry, Map of Trans-African Highways based on data 2000 to 2003

Lake Victoria and Northern Corridor Roads Network

Within Uganda, the JKM Corridor is centrally located within the 2,100 km Northern Corridor, seen in Figure 10, which is the most important and busiest multi-modal cross-border transport corridor in East and Central Africa, linking the economies and trade of the Democratic Republic of the Congo (DRC), Burundi, Rwanda and Uganda through Kenya to the port of Mombasa.

The JKM Corridor is situated centrally within the Lake Victoria Region. Owing to a large and stable water resource, the region has attracted and boasts a high urban population density and many cities with over

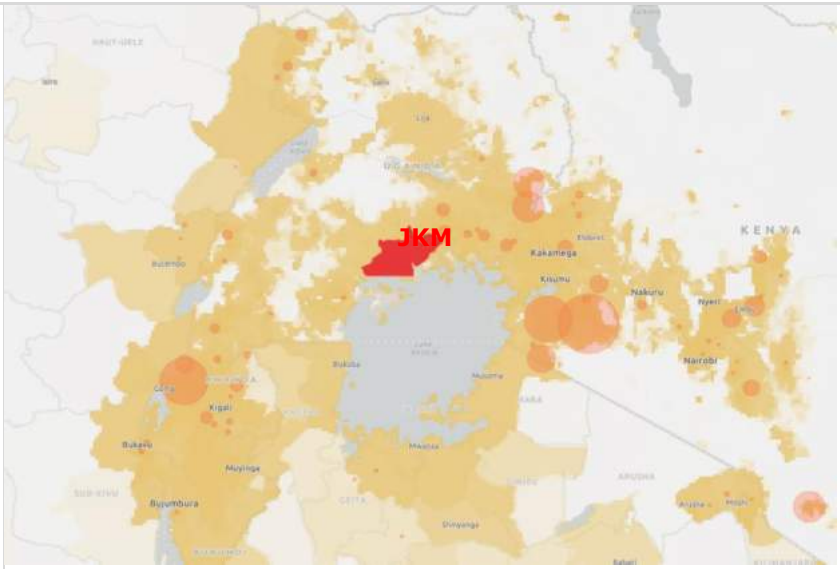
100,000 inhabitants that have grown rapidly between 2000 and 2015. Most of these cities are to the east of the corridor.

Figure 11: Lake Victoria Region and Northern Corridor Roads Network

MAP 1:

LAKE VICTORIA URBAN POPULATION DENSITY AND GROWTH OF URBAN CENTRES

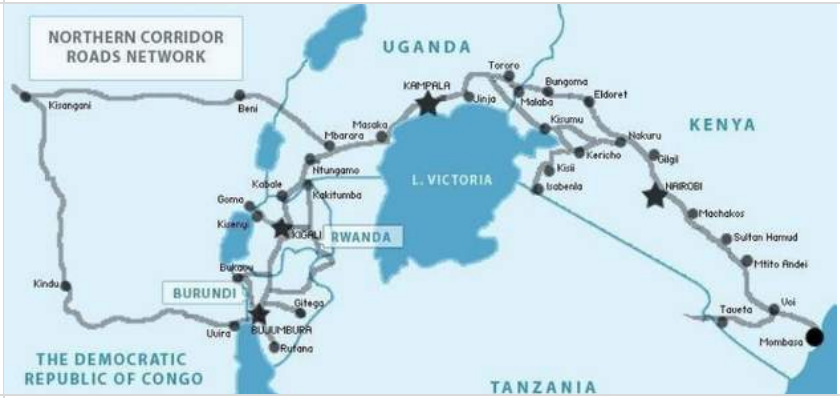
JKM is at the centre of a heavily urbanised Lake Victoria region. Urban centres with the largest population growth are primarily located to the east of JKM.



MAP 2:

NORTHERN CORRIDOR ROAD NETWORK

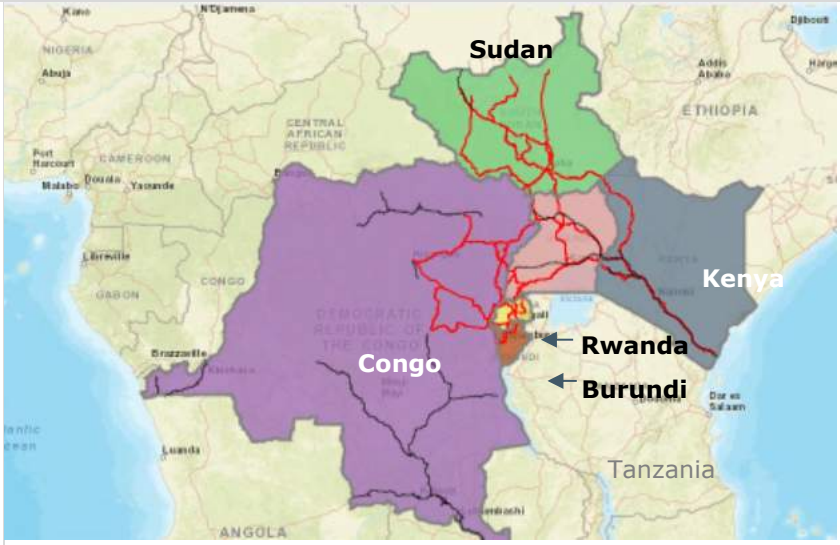
JKM is at the centre of the NCRD, which stretches from the Democratic Republic, Rwanda, Kenya, and Tanzania. The network passes through 34 urban centres.



MAP 3

NORTHERN CORRIDOR MEMBER STATES

These states span the African continent from the Atlantic Ocean to the Indian Ocean.



3.4.2 The JKM Corridor within Uganda

The JKM Corridor is a designated planning area of some 2,200 square kilometres covering parts of Uganda's Central and Eastern regions. As depicted in Figure 12 and Figure 13 it incorporates the districts of Mpigi, Wakiso, Mukono, Buikwe and Jinja in their entirety, as well as Kampala City. The Corridor thus includes the Greater Kampala Metropolitan Area (GKMA), two cities and several municipalities and towns. Contained within GKMA, Kampala City has five divisions and is administered by the Kampala Capital City Authority (KCCA), a national government ministry established by the 2010 KCCA Act.

Besides Kampala City, JKM includes Jinja city, which recently upgraded from a "town" in 2021 after a century of urban development. Municipalities in JKM include Lugazi in Buikwe District and Nansana in Wakiso District. Towns are Buikwe and Nkonjeru towns in Buikwe District; Kakira, Buwenge and Bugembe in Jinja District; and Wakiso, Namayumba, Masuliita, Kakiri, Kasangati, Kyengera, Kajjansi and Katabi in Wakiso District.

Figure 12: JKM Regional Corridor Map

Source: COWI A/S

The JKM area includes the Greater Kampala Metropolitan Area (GKMA), which was declared as a Special Planning Area in 2012 and has a Cabinet-approved GKMA Development Framework 2040, dating from 2013. This spatial definition for the GKMA incorporates the municipalities of Entebbe, Nansana, Kira, and Makindye-Ssabagabo in Wakiso District, Mukono in Mukono District, and Mpigi Town in Mpigi District, as well as eight towns in Wakiso, namely Wakiso, Namayumba, Masuliita, Kakiri, Kasangati, Kyengera, Kajjansi and Katabi.

The JKM Corridor area definition goes beyond the GKMA in adding Buikwe District, to the east of Mukono District, which incorporates Lugazi and Njeru municipalities and Buikwe and Nkokonjeru towns. Across the regional boundary, Jinja District in Eastern Region includes Jinja City (which includes the current municipality, Bugembe, Mafubira and Budondo) and the towns of Kakira and Buwenge.

JKM Cities, Municipalities and Town Councils

Figure 13 shows the location of two cities, four municipalities, eleven town councils and other sub-counties in the JKM Corridor. Specifically, the cities are Kampala Capital City Authority and Jinja City. The municipalities are Entebbe, Mokono, Nansana and Lugazi, Kira, Njeru. And the towns are Wakiso, Mpigi, Bugembe (now part of Jinja City), Kakira, Buwenge, Kakiri, Nkokonjeru, Gayaza, Kasangati, Kira, Kabasanda, Kamengo, Matugga, Nabusanke, Nagalama, and Nkoko.

Observing the spatial distribution of these areas, we find that a set of cities, municipalities and towns form a contiguous cluster around Kampala, another set forms a cluster around Jinja City and the third set around Buikwe. The other towns stand by themselves.

Figure 13: Lower-Level Administrative Areas in the JKM Corridor

Source: COWI A/S

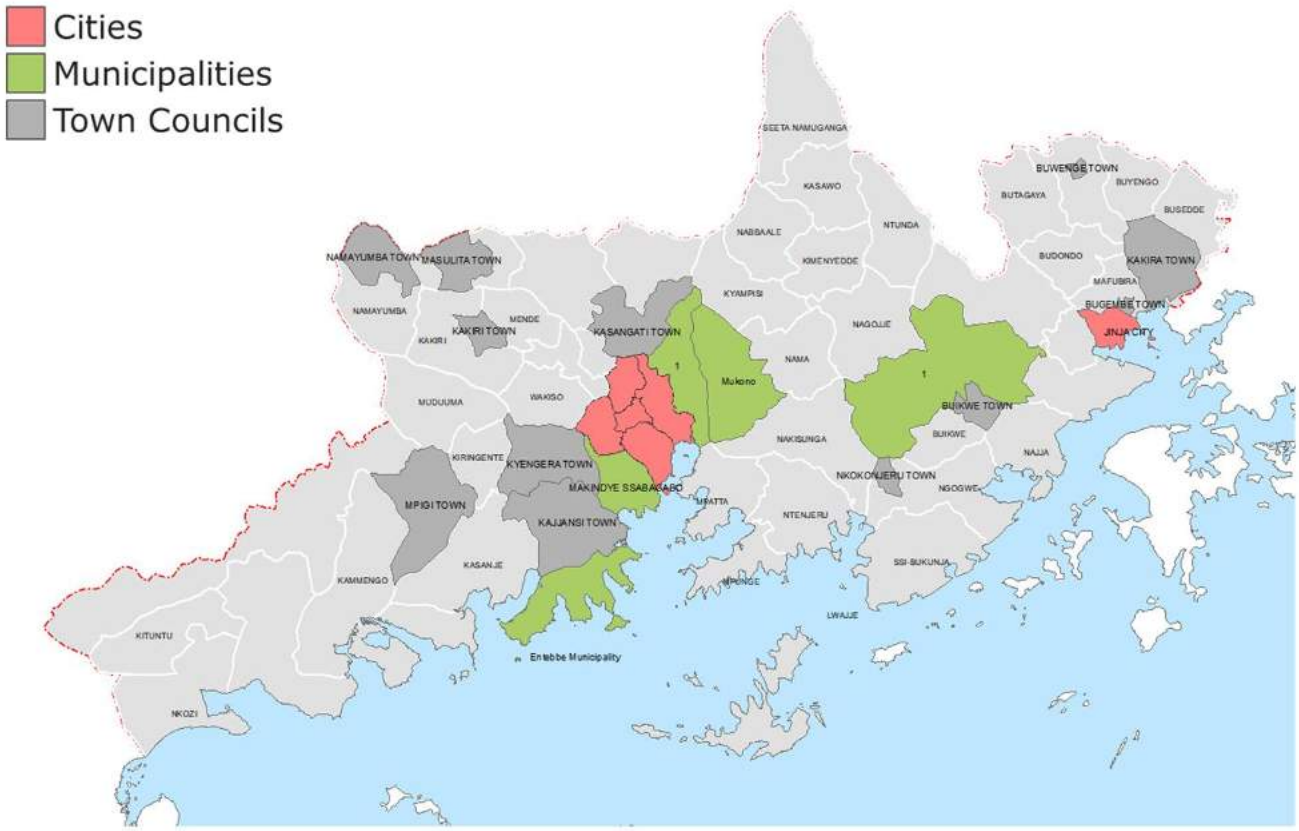


Figure 14 shows the JKM Corridor in a wider, southern Uganda regional context. We identify — beyond the Corridor boundary but within an hour's drive — several built-up urban areas (in orange in Figure 14 below) with higher-density cores (in black), all with sizeable populations as seen in Figure 15. Some of the towns are close to one another and may be seen as city clusters.

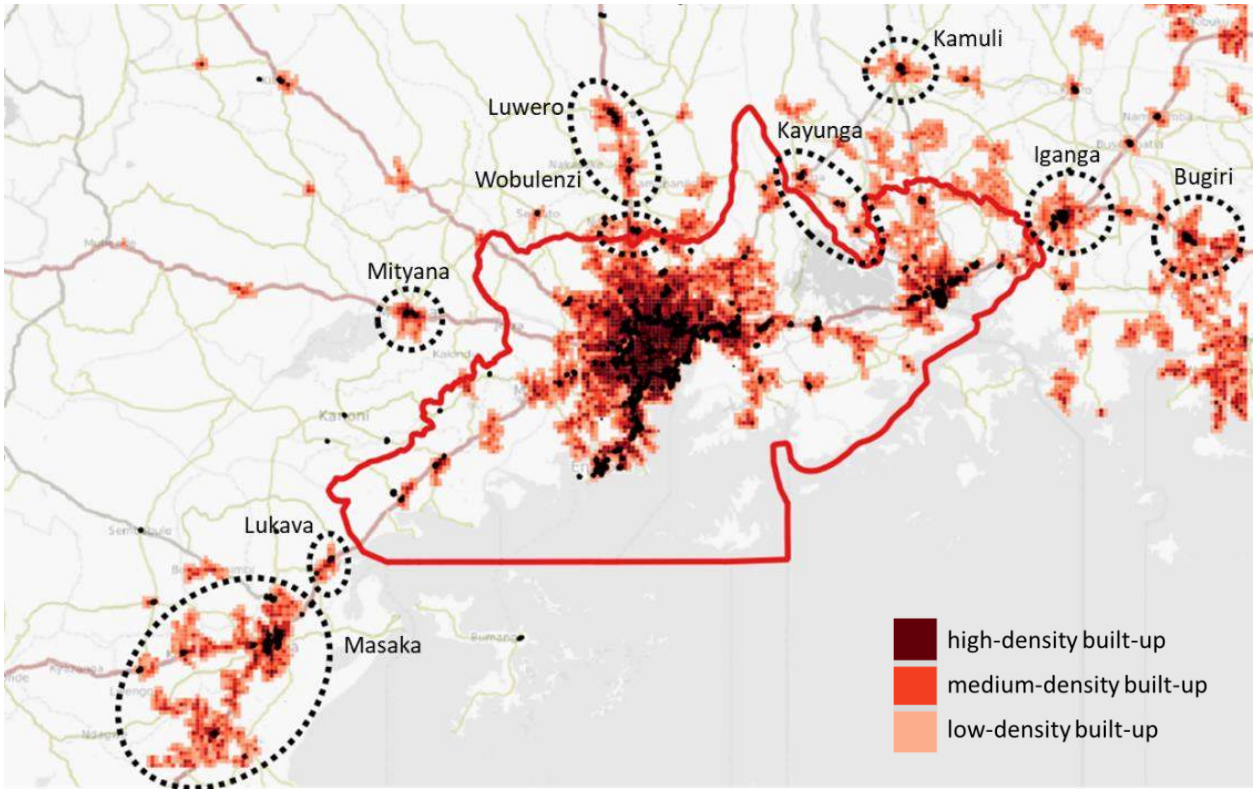
Here we see that urban growth spills over the JKM boundary; within an hour's drive to JKM, there are several built-up urban areas with higher-density cores. Some of these have sizeable populations, such as

Masaka and Kaliso with about 100,000 each, as shown in Figure 15. All are located on important radial transport corridors emanating from Kampala or Jinja.

Almost all these urban areas have good transport links to JKM. Masaka and Lukava, to the west, and Iganga and Bugiri, to the east, are well linked to JKM along the Northern Corridor. Wobuleni and Luweri are on the expressway to the north. Mityana is on the road to Port Royal. Urban development in the Kayunga area occurs along a road that falls outside the JKM boundary but connects to its parts.

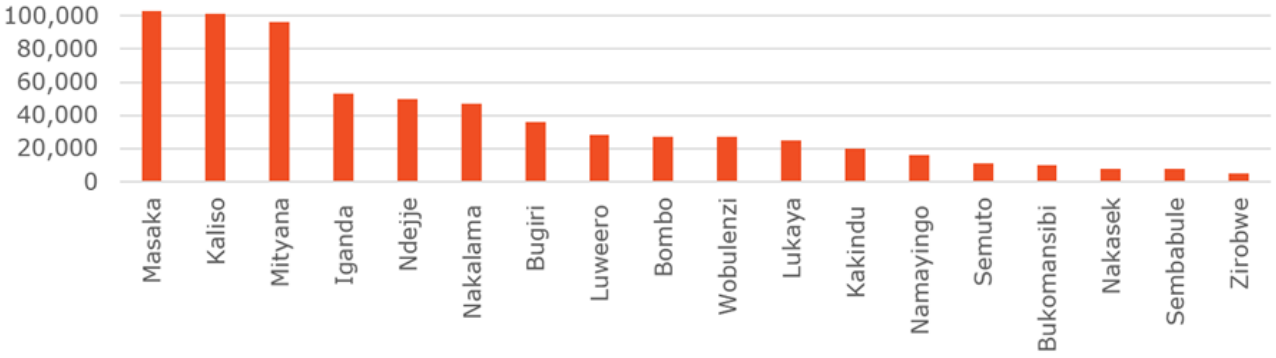
Although outside JKM, these places will interact with JKM and its development through flows of commuters, shoppers, students, tourists and more. Some of these places may start to merge, such as Masaka and Luwero/Wabulenzi. So, while not officially being a part of the JKM Corridor, these areas must be engaged in the JKM planning and development control process.

Figure 14: JKM Corridor in Southern Uganda and Urban Areas outside its boundary



Source: COWI A/S

Figure 15: Population of towns within about one hour of JKM boundary



Source: COWI A/S and UBOS

This section sets out the evidence base upon which the JKM Corridor spatial strategy is founded. It examines the demographic trends at different spatial scales, urbanization and spatial expansion, metropolitanisation, and connectivity and mobility.

3.4.3 Demographic trends

Demographic trends drive the need for regional and urban plans to guide physical growth into existing or expanded urban areas. These trends are discussed below at different spatial scales. From the small scale to the large scale, these are scales are Uganda, Kampala, JKM, Districts and individual settlements.

Uganda

Uganda's population, now about 48 million, is growing rapidly and urbanizing even faster. By 2030, the population may exceed 63 million, some 15 million more than today. By 2040, it may reach 83 million, some 35 million more and almost double today's population (WUP 2018).

Uganda's urban population, now about 12 million, is predicted to increase absolutely and as a share of the total population. It may reach 20 million by 2030 and almost 33 million by 2040, respectively 8 and 21 million more than today (WUP 2018).[35,36]

Uganda’s urbanization rate has increased profoundly in the 21st Century. Between 2005 and 2010, Uganda's built-up area grew ten-fold, and the urban share of the population reached almost 20 percent. Between 2010 and 2019, annual urbanization rates continued to increase by about 5 percent per year. The share of the population living in urban areas, now 25 percent, may grow to 31 percent by 2030 and 40 percent by 2040. Urbanization is still at an early stage, with about 70 percent of Uganda’s current population working in subsistence agriculture.

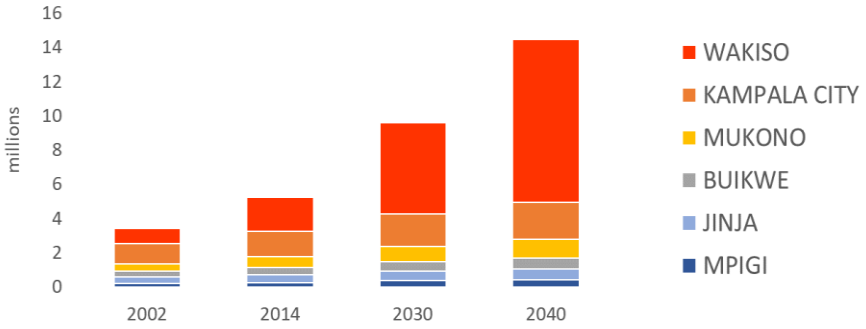
[35] The NPDP has a slightly different projection for 2040: 75 million population, with 23 million urban in the metropolis and municipalities (of which 8.5 million in GKMA), 7 million urban, and 24 million rural. It also projects 100 million by 2060, with 40 million urban in the metropolis and municipalities (of which 10 million in GKMA), 10 million urban, and 50 million rural.

[36] Vision 2040 projects a total population of 61 million by 2040, with 37 million urban, 24 million rural.

JKM Corridor

JKM's population grew from about 3.42 million in 2002 to 5.2 million in 2014 at a rapid average annual rate of 3.6 percent (Figure 16).

Figure 16: JKM Population 2002, 2014, 2030 and 2040



Source: UBOS

JKM's population will continue to grow. Estimates for the 2030 population range between 9 and 11.5 million; estimates for 2040 range between 12 and 19 million (Figure 17).

- UBOS projects that JKM may grow to 9.5 million in 2030 and 14.4 million in 2040[37] – up from today's 7 million. In this view, the annual growth rate of 3.82 percent per year between 2014 and 2030 would increase to 4.22 percent between 2030 and 2040.

- If JKM maintains its present 14 percent share of Uganda's total population — a slightly more conservative scenario — it will reach 9 million by 2030 and 12 million by 2040. This means that it will have to accommodate some 2 million more people by 2030 and another 3 million by 2040.

- If JKM maintains its present 57 percent share of Uganda's urban population — a slightly less conservative scenario — it will reach 11.5 million by 2030 and 19 million by 2040, or 4.5 million more by 2030 and another 5.5 million by 2040.

Figure 17: Estimates of JKM's future population

Assumption	2022	2030	2040
Maintain a 14 percent share of Uganda's population	7	9	12
UBOS (increase growth rate)	7	9.5	14.4
Maintain a 57 percent share of Uganda's urban population	7	11.5	19

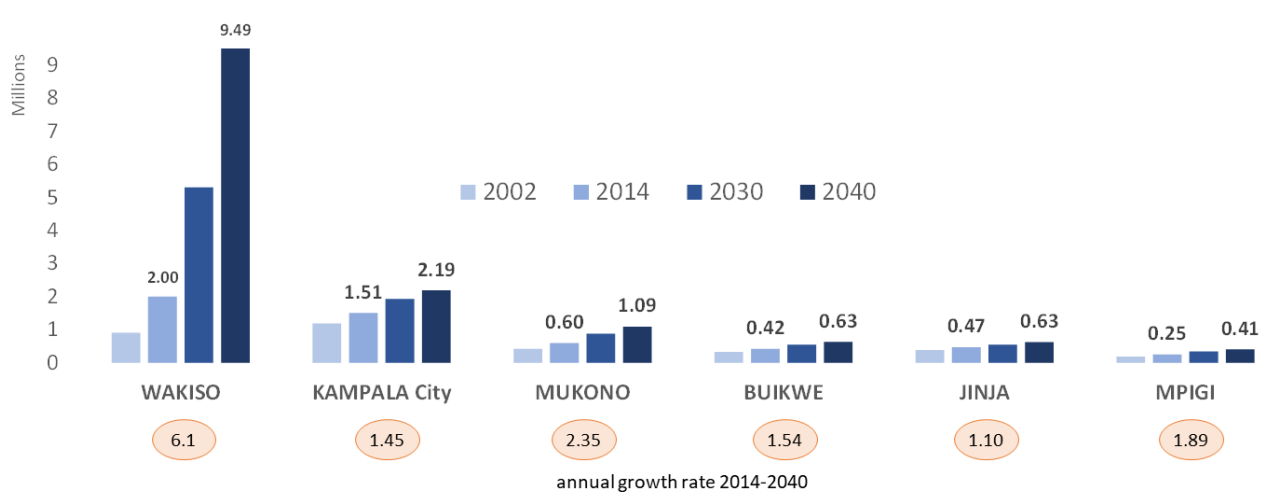
JKM Districts

JKMs districts are projected to grow at different rates, according to UBOS (Figure 18). Wakiso, now the largest district, may grow the fastest, surpassing 5 million by 2030 and over 9 million by 2040. Wakiso has seen rapid spatial development in areas bordering the GKMA, as well as along the road and rail corridors between Kampala and Lake Victoria, and between the city and Entebbe International Airport.

37

Kampala City, now the second largest district, will retain that position, but its growth rate may be superseded by Mukono's, Mpigi's and Buikwe's, while Jinja's rate may be the slowest.

Figure 18: Projected Population in JKM Districts in 2030 and 2040



Source: UBOS

Urban Settlements

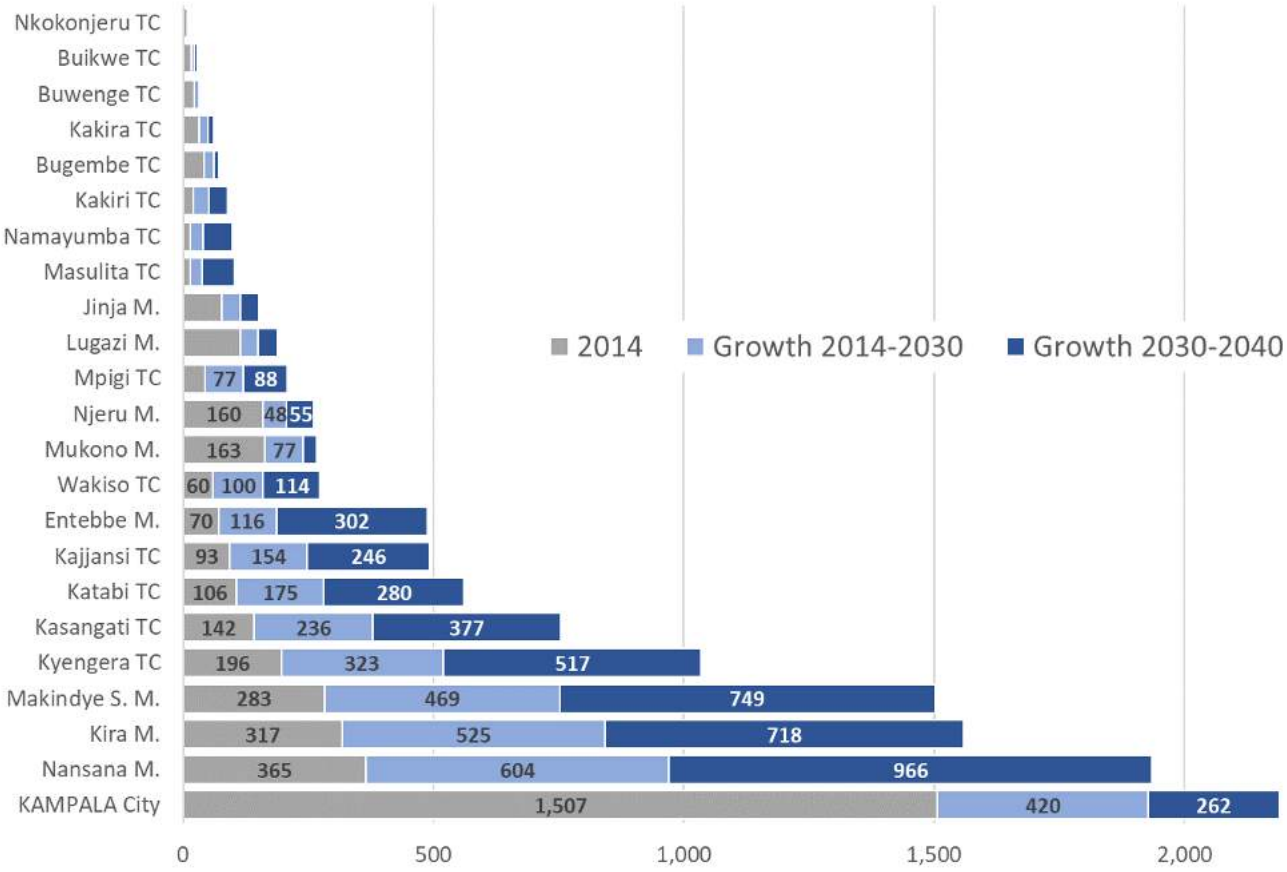
UBOS projects population increases in 23 of JKM's urban areas by 2030 and 2040 (Figure 19). At one extreme, Kampala City, the most populous, with 1.51 million in 2014, may grow by an additional 420,000 between 2014-2030 and another 262,000 between 2030-2040, for a total of 2.18 million by 2040. Nansana Municipality (Wakiso), the second most populous, may grow by over 600 thousand between 2014-2030 and over 960 thousand between 2030-2040, for a total of 969 thousand in 2030 and 1.93 million in 2040. At the other extreme, the smallest settlements in 2014 will grow by very modest amounts.

Growth in three areas (Nansana, Kira, Makindye) may exceed Kampala's between 2014 and 2030 and between 2030-2040, with Kyengera's growth exceeding Kampala's from 2030 to 2040.

The total population in these 23 urban areas, 3.8 million in 2014, may double to 7.4 million by 2030 and to 12.3 million by 2040. These areas may thus grow by 3.5 million between 2014-2030 and 4.9 million between 2030-2040.

Coping with the rate of growth is a challenge. The populations of the four largest areas will double, as will Kasangati, Katabi, Kajjansi, Entebbe and Wakiso.

Figure 19: Population Projections to 2030 and 2040 (in '000)



Source: COWI based on UBOS data

The demographic challenge is greatest at the level of individual urban settlements. At this level, increased populations may overstretch the capacity of a municipality's infrastructure and services; new households, not finding suitable accommodation, may crowd in with other households or move to existing informal settlements; or form new informal settlements; and settlements that reach certain population thresholds will start to demand higher levels of public investment.

3.4.4 Current spatial trends

As with many sub-Saharan African cities, physical growth in JKM is 'dispersed'. It is mostly low-rise sprawl with some 'infilling' in several urban 'cores' within the urban footprint. Most growth has occurred along the main highways and roads radiating out of Kampala and Jinja.

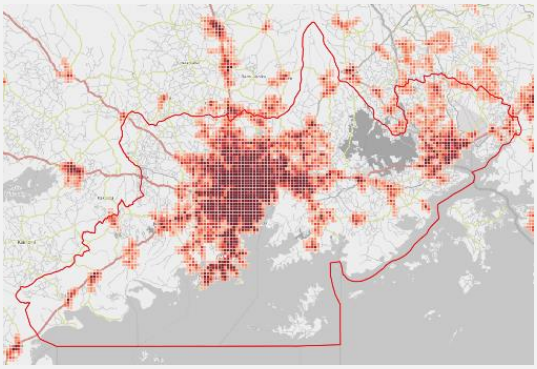
To begin to ascertain trends, we used two datasets. The Global Human Settlements (GHS) built-up grid is derived from Sentinel-2 global image composite for the year 2018 using Convolutional Neural Networks. This new method, called the Degree of Urbanisation, classifies a country into three classes: cities, towns and semi-dense areas, and rural areas. The method has been endorsed by the 51st Session of the United Nations Statistical Commission.

The Center for International Earth Science Information Network (CIESIN) at Columbia University provides a set of analysed building footprints prepared by Ecopia Vector Maps Powered by Maxar Satellite Imagery. The dataset provides a finer-grain understanding of the coverage of human settlements in the Corridor. In addition to urban built-up areas, the CIESIN data identifies small settlements (SS) and hamlets (HL) that together cover almost all of the JKM area. These low-density settlements and hamlets are an important element of the area's population. They are also subject to absorption into the expanding built-up areas and have the potential to become built-up themselves. The CIESIN dataset defines built-up areas (BUA), small settlement areas (SSA), and hamlets (hamlets) as follows:

Figure 20: Definition of built-up areas, small settlements, and hamlets

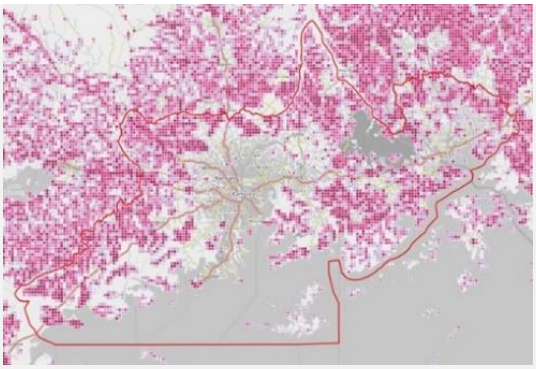
Built-up areas

A built-up area (BUA) is generally an area of urbanisation with moderately-to-densely-spaced buildings and a visible grid of streets and blocks. Built-up areas have contours with an area greater than or equal to 400,000 meters square with a building density of thirteen or more across the entire area.



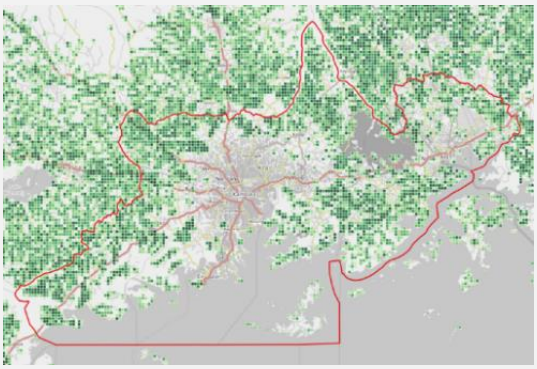
Small Settlements

A small settlement (SSA) is a settled area of inhabited structures and compounds of roughly a few hundred to a few thousand inhabitants. The housing pattern in SSAs is a collection of family compounds that adjoin other similar habitations. Small settlement areas have 50 or more buildings and are not considered a BUA.



Hamlets

A hamlet is a collection of several compounds or sleeping houses in isolation from small settlements or urban areas. Hamlets are a collection of low-density settlements between one and 50 buildings that falls within 65 meters of one another.



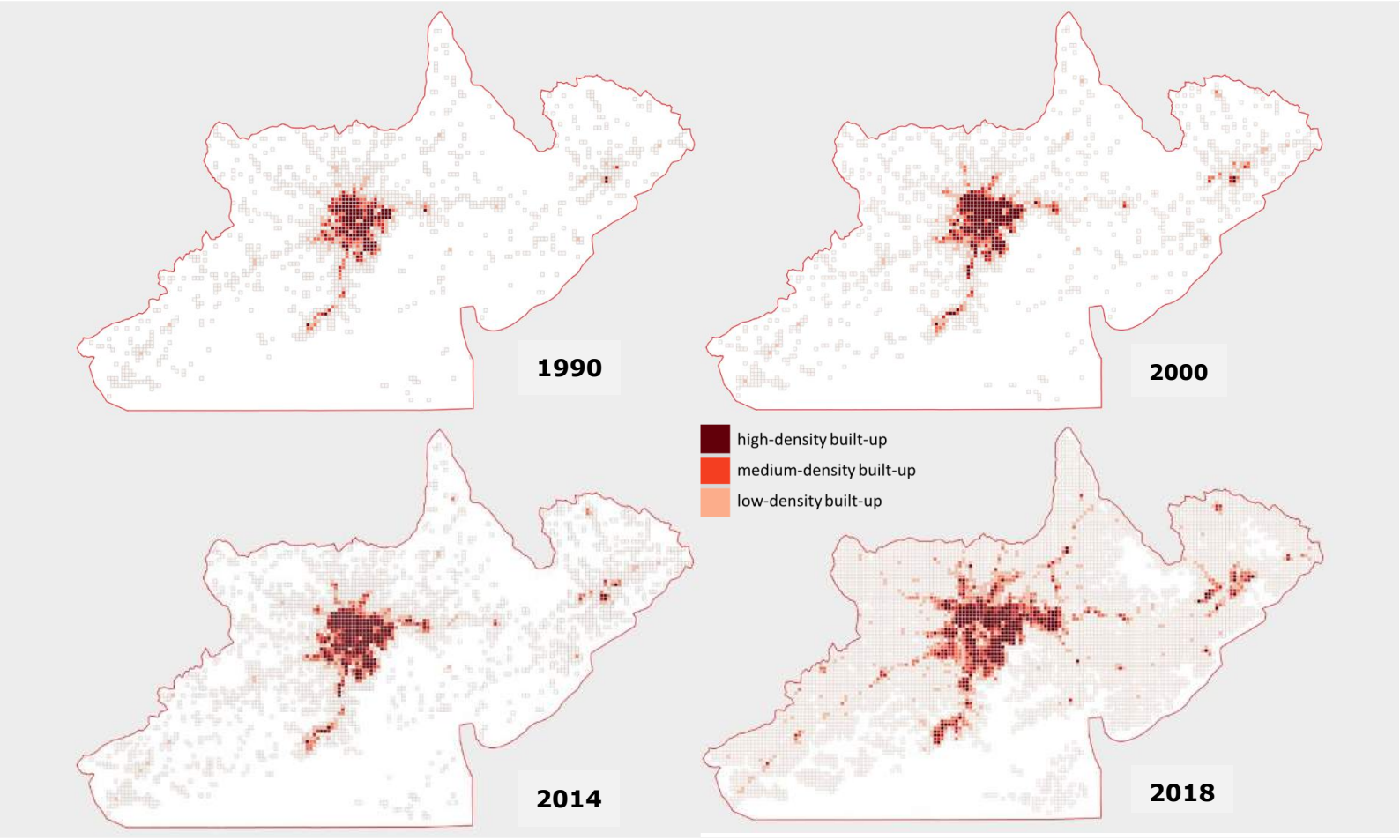
Source: CIESIN

Expanding and Densifying Urban Areas

Urban areas have expanded since well before 1990. But in the last decades, the pattern of increase can be captured and analyzed by satellites as with the GHS and CIESIN data (Figure 21 below). In 1990, most of the urbanized area was in and around Kampala City, stretching thinly along main arterial transport routes to Entebbe, and in a few places along the east-west Northern Corridor and in Jinja.

By 2000, high-density areas consolidate in the Kampala core and emerge in Entebbe and Jinja. The same pattern continues into 2014.

Figure 21: Urban expansion in JKM 1990-2018

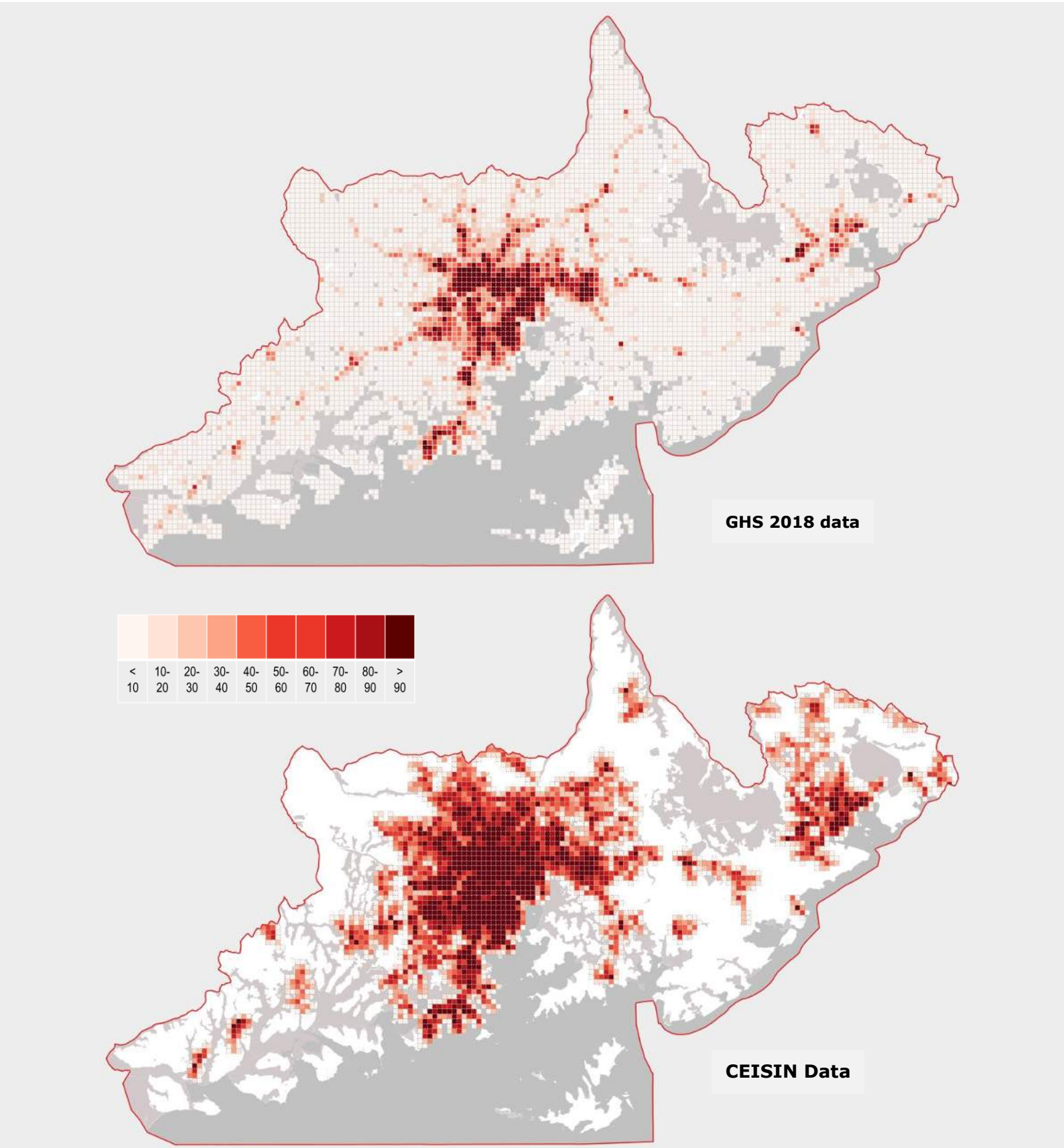


Source: Global Human Settlements (GHS) data

But by 2018, high-density areas increased significantly in Kampala, Mukono, Jinja and Entebbe, and along transport corridors, while low-medium density and low-density area emerge in almost half of the JKM area. By that time, more than 50 percent of the JKM territory was covered with some form of physical development, as indicated by the light grey areas. Low-density built-up areas are 'dispersed,' comprising mostly low-rise buildings. High-density built-up areas have increased and expanded. Ribbon development is evident along major corridors.

Figure 22 below shows two images of JKM built-up areas using the GHS and CIESIN data respectively.

Figure 22: JKM Built-up areas in 2018 by relative density



3.4.5 Distribution of human settlement land cover

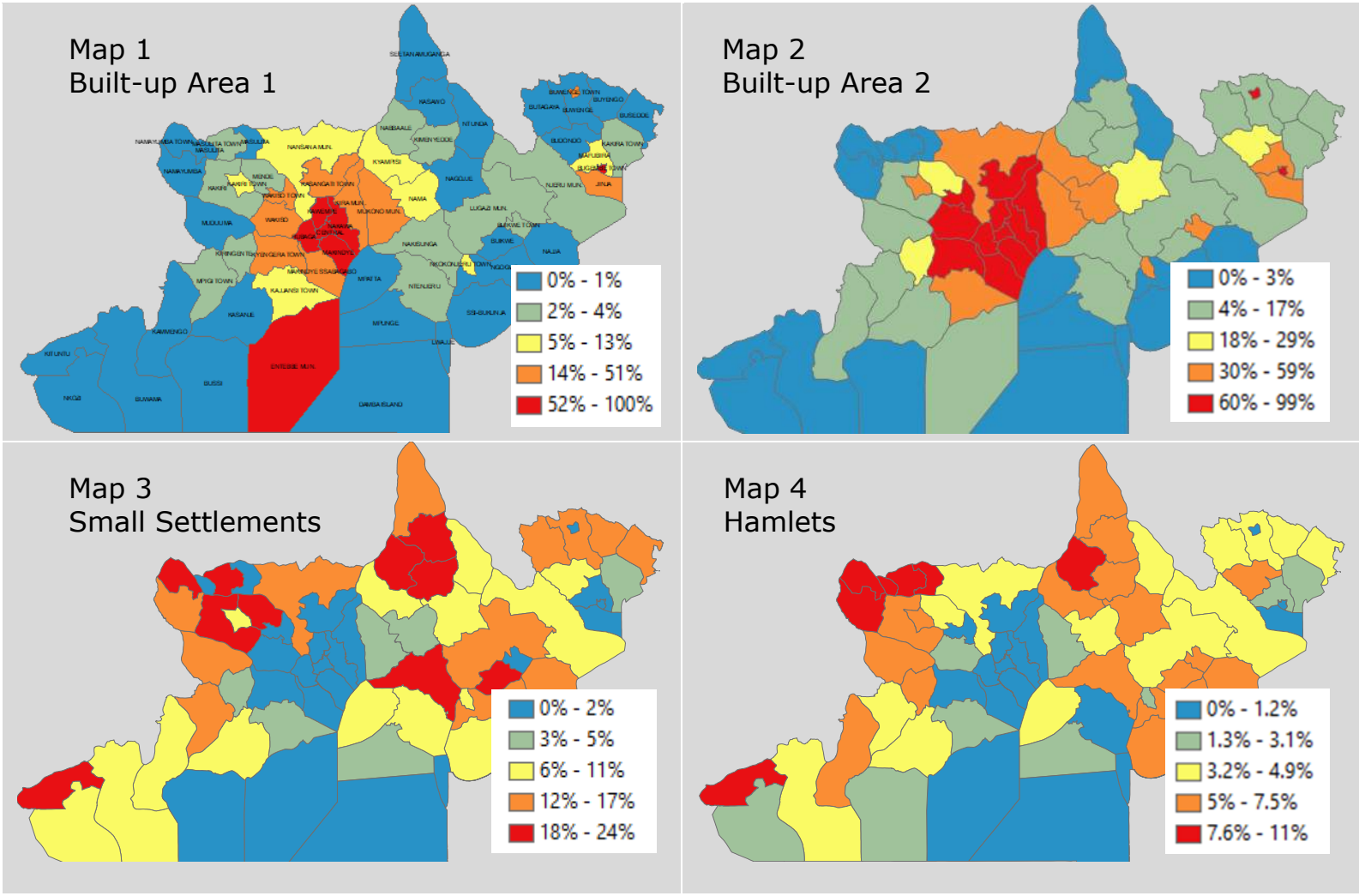
We analysed two datasets of human settlement land cover. One, the UBOS Remote Sensing Survey, provides data on built-up areas in 2015; we term this data BUA-1. The other, BUA-2, from CIESIN, provides as seen above a dataset for built-up areas, small settlements and hamlets in 2018.[38] BUA-2 areas are urban in nature, with moderately-to-densely-spaced buildings and a visible grid of streets and blocks. Small Settlements (SSAs) are settled areas with inhabited structures/compounds of roughly a few hundred to a few thousand inhabitants. Hamlets (HAMLET) are collections of several compounds or houses in isolation from small settlements or urban areas.

Human Settlement Extent by Sub-county

Figure 23 provides a generalised picture of the level of urbanisation, as indicated by colour. Map 1 and 2 in Figure 23 show that sub-counties with the higher shares of BUA-1 & BUA-2 are in the GKMA area and Jinja City, which are perceived as the most urbanised.

[38] The dataset used here is derived from the Center for International Earth Science Information Network (CIESIN), Columbia University. It provides a set of analysed building footprints prepared by Ecopia Vector Maps.

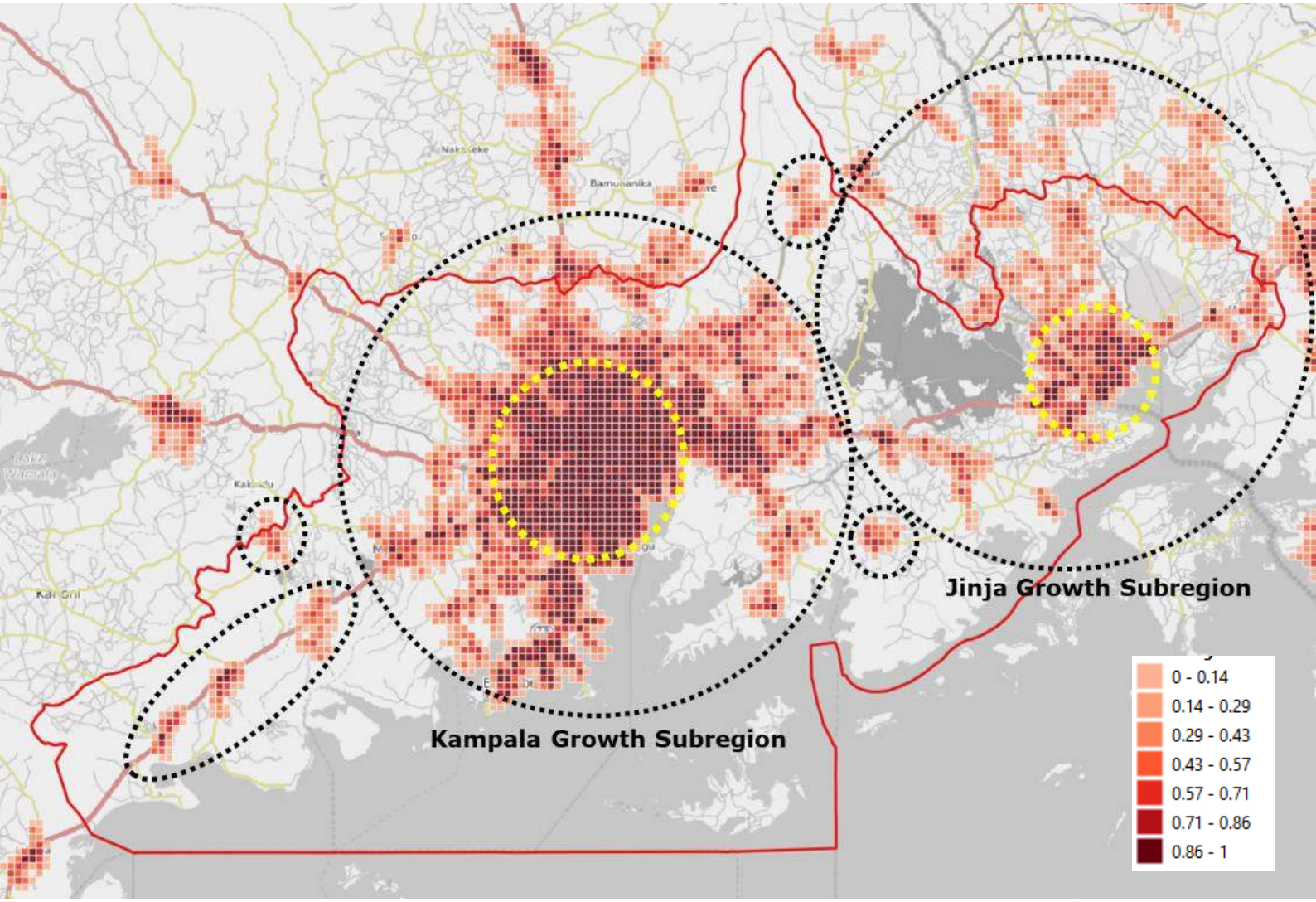
Figure 23: Density of human settlements by Subcounty



Built-up Land in 1 km x 1 km Grid

Figure 24 shows our spatial analysis of built-up (BUA-2) land cover, prepared by placing a 1km x 1 km grid over the satellite image of the built-up land cover. Each grid cell displays the built-up area density by colour shade. For example, a dark brown cell means that the built-up area covers between 86 and 100 percent of the cell; a light brown cell means it covers less than 14 percent. A cell that is less than 100 percent built-up or not coloured may have a combination of small-settlements, hamlets, or no buildings at all.

Figure 24: Built-up area (BUA-1), Growth subregions, Growth areas



Source: COWI A/S analysis of CIESIN GRID data

Metropolitan Growth

Moreover, in Figure 24 abovewe observe that JKM has been growing in a way that may be described as "metropolitan" in the form and emergence of two metropolitan regions around Kampala and Jinja. These regions do not have official jurisdictions, rather they are observed as spatial development entities.

A metropolitan area, or "metro", may be defined as a region with a densely populated urban core and less-populated surrounding areas that share industries, commercial areas, transport networks, infrastructure and housing. A metro usually has multiple local authorities and districts, and often includes satellite cities and towns.

The built-up pattern within JKM also has the following characteristics:

1 JKM is about 50 percent urbanised: Cells with some built-up areas cover about half of the JKM territory, and built-up areas cover (almost) all of GKMA and Jinja City.

2 Two urban cores: Built-up area density is highest (dark brown) in the 11.3-kilometre radius core of Kampala and the 5-km radius core of Jinja City, as identified by the yellow dotted circles. Another cluster of high-density cells is seen on the corridor between Kampala and Jinja and the corridor between Kampala and Mukono.

3 Emerging wider Kampala metropolitan area: The contiguous built-up area around Kampala — extending outside the corridor to the north, largely falls within a roughly 35-kilometre radius of Kampala CBD. This built-up area varies in density and is shaped largely by the radial roads. We suggest that this may be considered an emerging metropolitan area.

4 Emerging Jinja metropolitan area: The partly contiguous and partly fragmented built-up area around Jinja — also extending outside JKM, falls within a roughly 35-kilometre circle radius of Jinja City. This built-up area also varies in density and is shaped by radial and circumferential roads. We suggest that this may also be considered an emerging metropolitan area.

5 Kampala Sprawl: A linear built-up area extends some 25 kilometres from Kampala into the Jinja circle along the Mukono-Kyetume-Katosi-Nyenga Road from Lugazi through Buikwe, including a gap of no development - to the Kyindi Ferry port to Buvuma Island. A similar case of sprawl extends north, although outside JKM.

6 Low Development zone: The built-up areas around Kampala and Jinja are distinct — they do not (yet) touch — and are largely separated by a zone of green areas that includes the Mabira Central Forest Reserve. We suggest that this be protected to prevent the merging of Kampala and Jinja City metropolitan areas.

7 Other built-up areas: There are six other instances of built-up areas with more than one contiguous built-up cell. Three are roughly equally spaced along corridor 1 (Nabusanke-Kayabwe, Buwama and Kamengo), perhaps forming a cluster; two are between the GKMA and Jinja circles: Nkokonjeru in the south on corridor 12 and Kasawu in the north on corridor 5; and one, Kibibi, is on no corridor.

Small Settlements and Hamlets in 1 km x 1 km Grid

Small settlements (SS) and hamlets (HL) are important for commuters and as a potential source of migrants to the built-up urban areas and as places that have the potential to become built-up themselves. Similar to the analysis in Figure 24 for built-up areas, Figure 25 shows our analysis for small settlements in Map 1 and hamlets in Map 2.

Figure 25: Small settlement and hamlet density in JKM

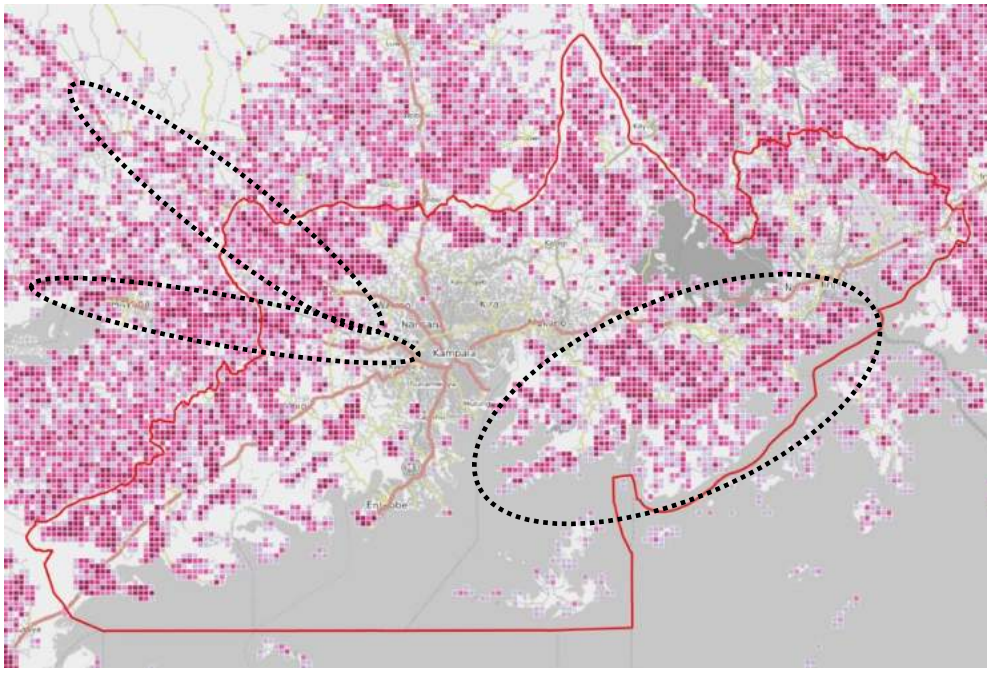
MAP 1

SMALL SETTLEMENT AREAS

Small settlements (SS) are found throughout JKM except near large built-up areas.

SS density is somewhat higher along road corridors.

SS density is higher on the east lake shore than on the west.



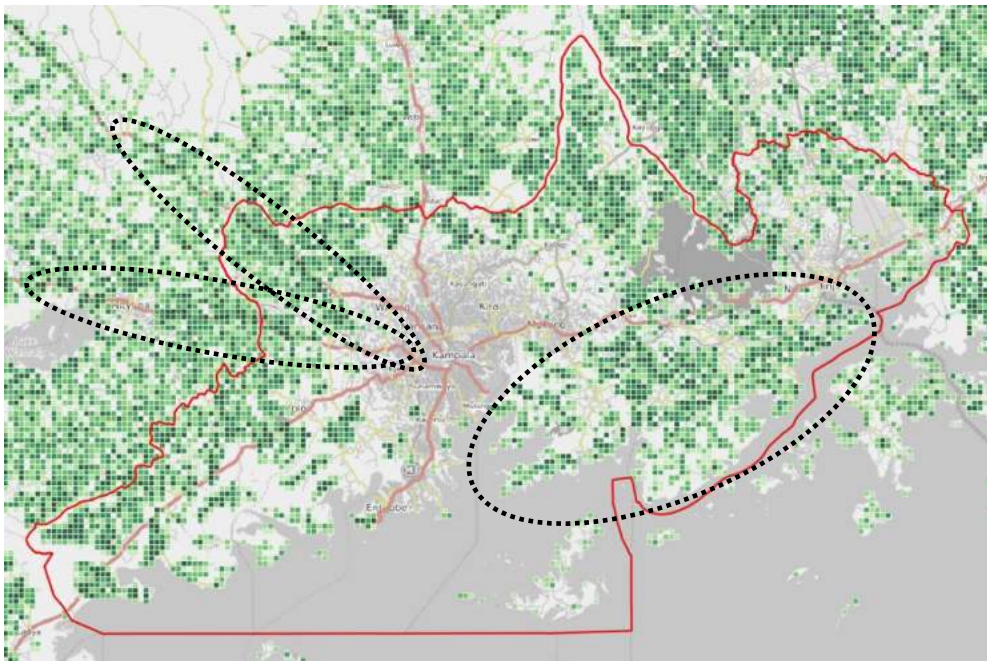
MAP 2
HAMLET AREAS

Hamlets (HL) are found throughout JKM except near large built-up areas.

Hamlet density is higher along road corridors.

Low-density hamlet cells number high-density cells.

HL density is higher on the east lake shore than on the west.

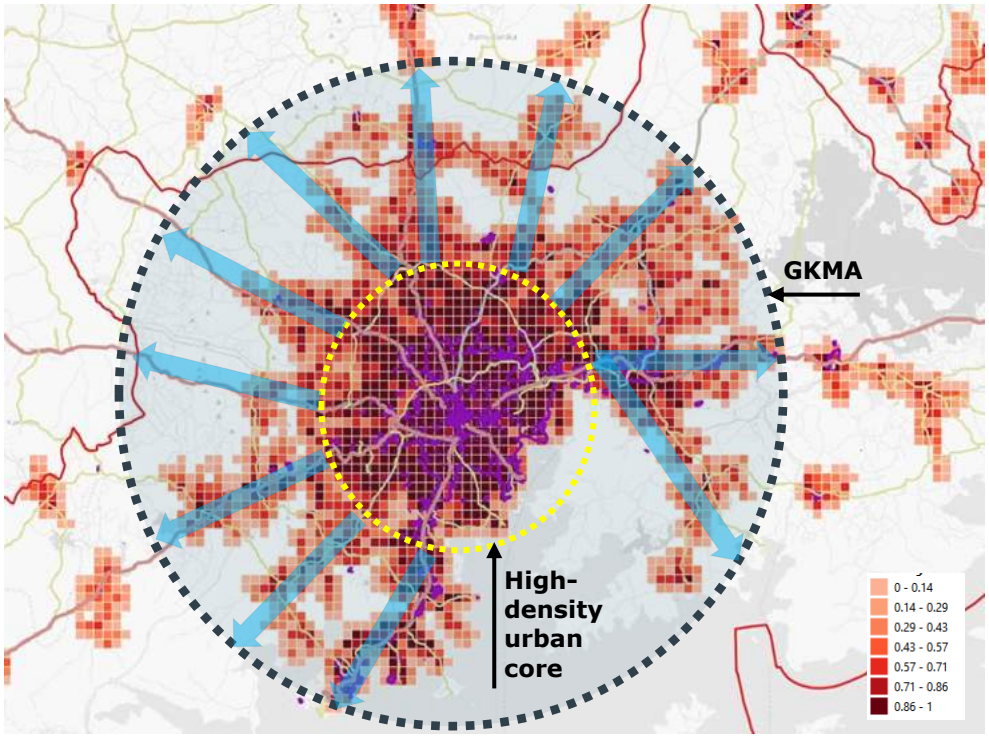


Source: COWI A/S analysis of CIESIN GRID data

The emerging Kampala metropolitan development circle

Figure 26 provides a detail of the built-up area within and around GKMA, which extends from a high-density central core largely along the major road corridors in the form of tentacles. The high-density areas also extend along these tentacles, particularly southward on the Entebbe Road and Entebbe-Kampala Expressway to Entebbe and eastward on the Jinja-Kampala Road A109 to Mukono. In theory, places with less than 100 percent built-up have development potential, but this needs to be studied at a finer grain.

Figure 26: Built-up Area in and around GKMA

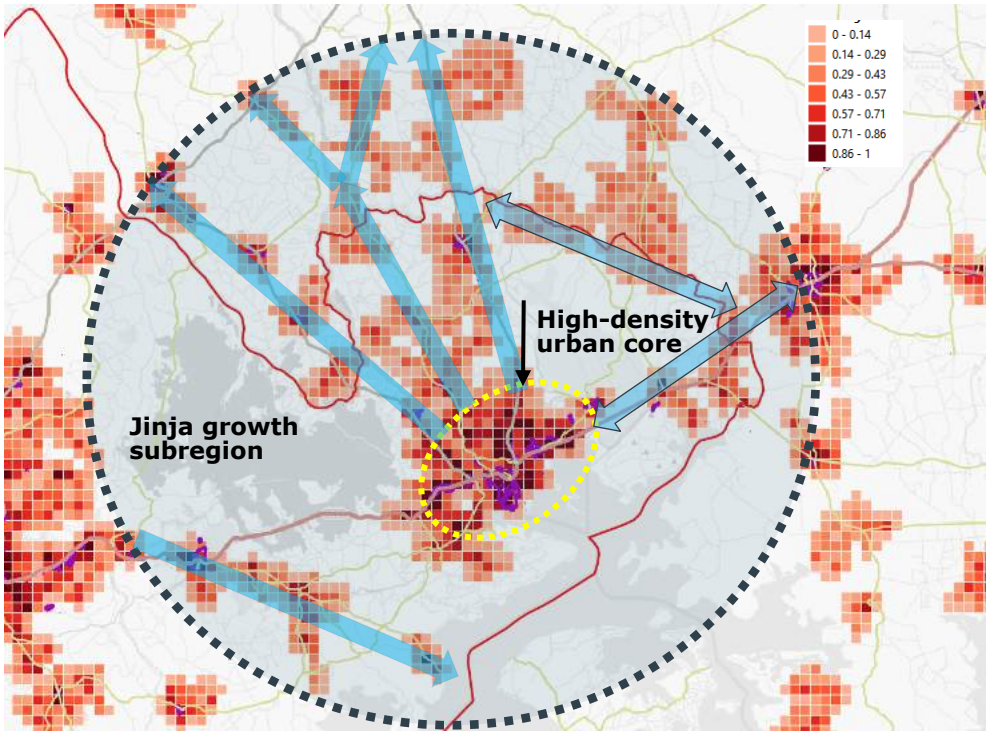


Source: Bing Buildings and COWI A/S

Emerging Jinja metropolitan development circle

Figure 27 (next page) provides a detail of the more complex and fragmented built-up area within and around the Jinja high-density core. The built-up pattern may be influenced by another built-up core, Iganga, only 35 kilometres away. The tentacles here are less pronounced. There is a built-up area in the north-east that is not directly linked to Jinja. It would seem that there is an opportunity, going forward, to propose a strategy for more structured growth in the area, the Jinja Growth Sub-region (JGS).

Figure 27: Built-up Area in and around JGS



Source: Bing Buildings and COWI A/S analysis

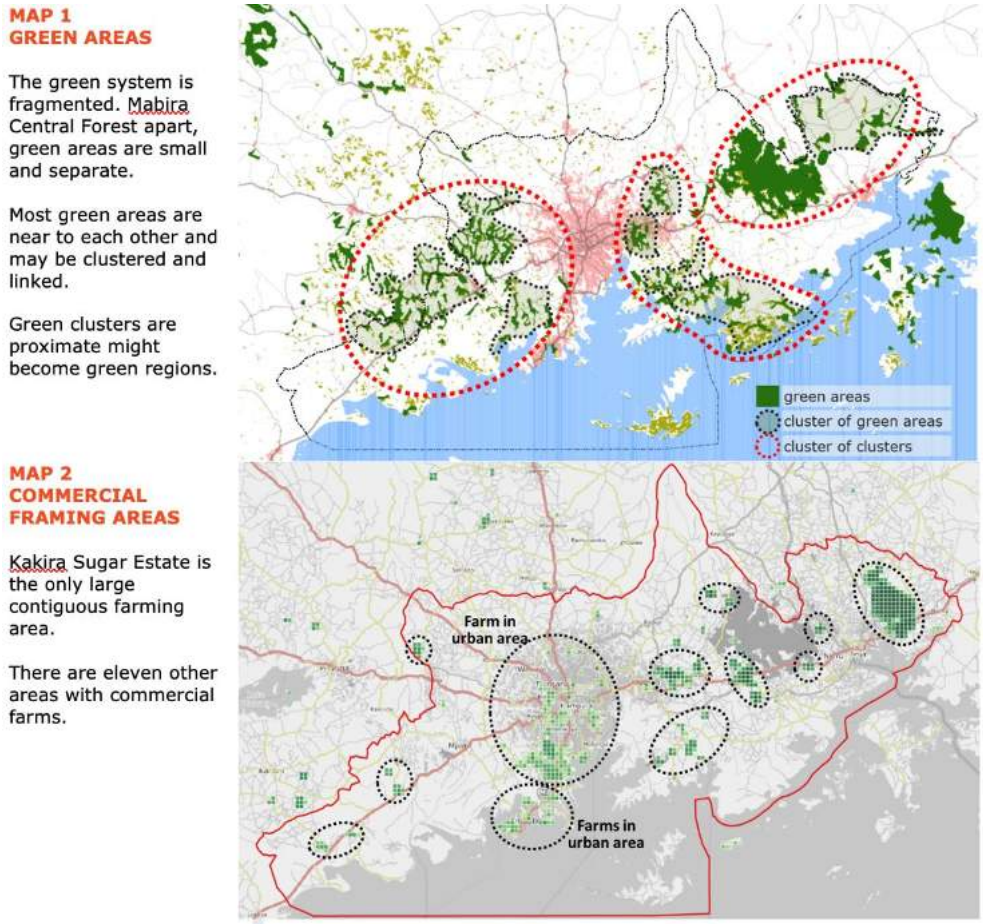
The two metropolitan areas are distinct — they do not (yet) touch — and are largely separated by a zone of green areas that includes the Mabira Central Forest Reserve. A linear built-up area extends some 25 kilometres from the KMR into the JMR circle along the Mukono-Kyetume-Katosi-Nyenga Road from Lugazi through Buikwe, including a gap of no development - to the Kyindi Ferry port to Buvuma Island. A similar case of sprawl extends north, although outside JKM.

3.4.6 Green and Commercial Farming Areas

We define green areas as places with natural resource assets including forests, hills, and quality agricultural land that justify conservation and preservation. Green area preservation and conservation implied in two of the JKM Corridor Plan Goals: "Efficiently planned, regulated and managed land uses that harmonise agricultural, industrial, residential, *natural and recreational* functions" and "A *resilient and sustainable natural and urban environment* that is adaptive to climate, health and economic shocks and stresses".

In Figure 28 we map the green areas and commercial farm locations and find that they can be clustered into green groups and green regions that can have an impact on the regional structure of JKM.

Figure 28: Green Areas and Commercial Farms.



Source: COWI A/S and Open Street Map

3.4.7 Transport Corridors

Transport corridors connect JKM centres to each other, connect JKM to the rest of Uganda, and connect JKM to its international neighbours. Regional plans like JKM can guide growth in the corridor, better link land use and transportation, and connect infrastructure to development decisions.

JKM contains more than twenty existing, significant, road corridors (Figure 30). In our view, the most important corridors in JKM are those that link Kampala and Jinja, Kampala and Entebbe, Kampala to the western international border, and Jinja to the eastern international border (Figure 29).

Figure 29: The most important corridors

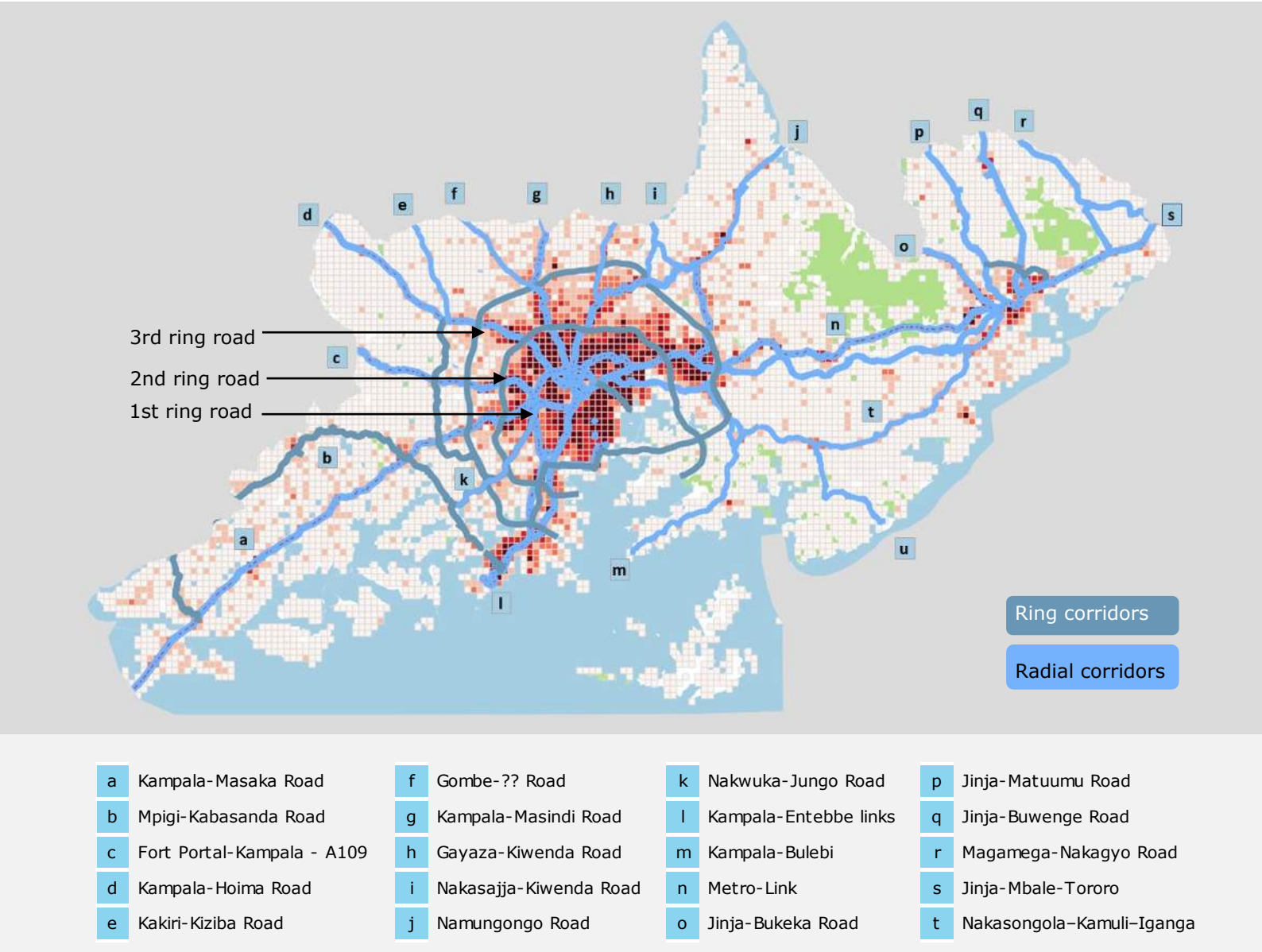
n	Links Kampala with Jinja.
s	Links Jinja to the border with Kenya
a	Links Kampala to Rwanda, Burundi and DRC.
g	Links Kampala to central and northern parts of Uganda.
l	Links Kampala with Entebbe

Strategic expressways, as defined by the Ugandan National Road Authority, are a, c, d, g, and n (see below).

Fourteen corridors are KMR radial roads; these start in Kampala City and radiate in all directions, forming the tentacle of the Kampala Metropolitan Region. Four corridors are JMR radials; these start from Jinja (o), (p), (q) and (s). Corridor (r) may be considered as part of a ring road around JMR.

Corridors (a), (n) and (s) are part of the Northern Corridor but also function as radials in KMR and JMR. Corridor (t) provides an alternative and longer connection between Kampala and Jinja, branching south at Mukono and forking at corridors (m) and (u), which terminate at the lake.

Figure 30: Existing Transport Corridors in JKM



a	Kampala-Masaka Road	f	Gombe-?? Road	k	Nakwuka-Jungo Road	p	Jinja-Matuumu Road
b	Mpigi-Kabasanda Road	g	Kampala-Masindi Road	l	Kampala-Entebbe links	q	Jinja-Buwenge Road
c	Fort Portal-Kampala - A109	h	Gayaza-Kiwenda Road	m	Kampala-Bulebi	r	Magamega-Nakagyo Road
d	Kampala-Hoima Road	i	Nakasajja-Kiwenda Road	n	Metro-Link	s	Jinja-Mbale-Tororo
e	Kakiri-Kiziba Road	j	Namungongo Road	o	Jinja-Bukeka Road	t	Nakasongola–Kamuli–Iganga

Source: COWI A/S

Planned Expressways

In addition to existing corridors, the Uganda National Road Authority (UNRA) has a long-term plan for the development of a future expressway network up to the year 2070, which includes new expressways to convey trade and connect the main cities. These expressways will reduce the effective distances between centres and serve to integrate the spatial economy.

Figure 31 shows a detail of the multi-phased plan at the JKM Corridor. Phase 1 (2020-2030, in red) includes the east-west expressway that corresponds to the above corridors (a), (n) and (s); corridor (g), the north-south link to Masindi; and an inner ring road around Kampala core. Phase 2 (2030-2050, in blue) includes new or upgraded radials that correspond to (c), (d), (h) and (u). Phase 3 (2050-2070, in green) includes expressways that connect Kampala to Jinja north of the forest, link Jinja to the north east and link (e) and (b).

Figure 31: Detail from UNRA national expressway plan to 2070

Source: Part of UNRA Expressway Plan

3.4.8 Urban Settlements

Based on evidence, we count 70 urban settlements in JKM, as shown in Figure 32 and listed in Figure 33. (Note that the National Physical Development Plan identifies a total of 60 urban settlements in all of Uganda (page 102): 1 capital, 10 regional cities, 15 secondary cities, 15 townships and 5 new cities. Of these, only three are in the JKM corridor: GKMA, Entebbe, Njeru-Jinja and Mubende.

We classify our settlements into one primary city (Kampala), one secondary city (Jinja), two municipalities (Entebbe and Mukono), 21 small towns and 45 large villages.

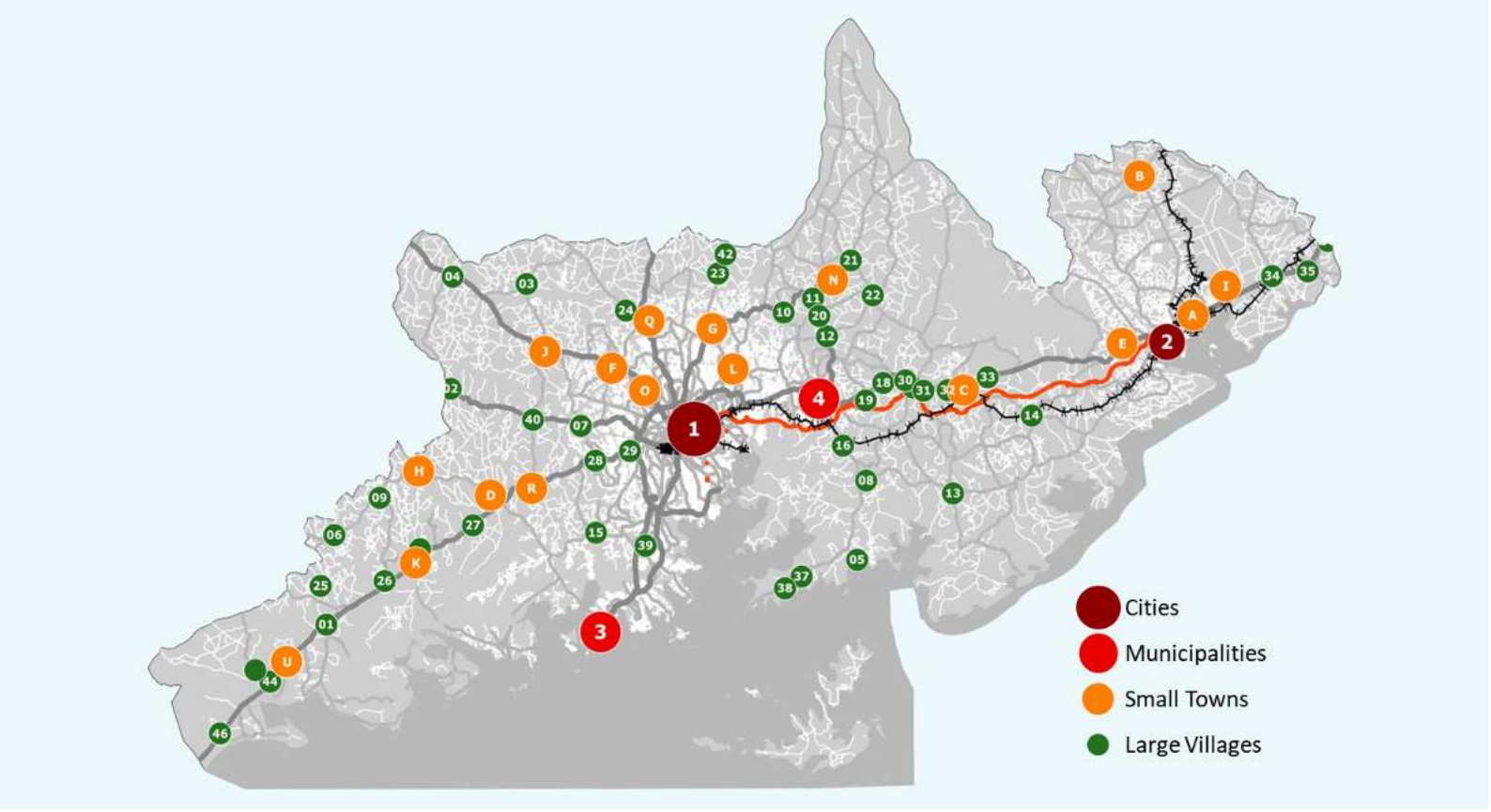
We identify these settlements by their concentration of built-up area compared to that in surrounding cells and named places on various datasets in Uganda, including OSM and shapefiles from GIZ. The hierarchical set of centres includes downtown Kampala, sub-regional centres, industrial areas and

freight/ferry terminals areas, urban/town centres, main street nodes, transit-oriented-development (TOD) neighbourhoods and mini neighbourhood centres[39].

The location of centers is important for the roles they play in the JKM economy. Twelve centres are located within KMR; eight centres are within JMR. Two centres (Kasawu, Nkokonjeru) fall a few kilometres short of the metropolitan regions and are linked to both. Four of the remaining centres are outside the metro boundaries, although Kamengo, Buwama and Nabisalke-Kayabwe are well-linked to KMR along the Northern Corridor Road and Kibibi is more remote. Fourteen centres are on the roads of the northern corridor, strengthening their economic value.

Centres are typically (i) places of mixed uses including residential, commercial, and industrial and (ii) places where future growth may be designated and encouraged. They come in multiple sizes.

Figure 32: City and Town Centres



Source: COWI A/S

[39] This is line with the aim of the NPDP.

Figure 33: List of Urban Settlements in JKM

NO	NAME	CLASS	DISTRICT HQ
1	Kampala	Capital City	District HQ
3	Entebbe	Municipality	Other Town
2	Jinja	Municipality	District HQ
4	Mukono	Municipality	District HQ
A	Bugembe	Small Town	Other Town
B	Buwenge	Small Town	Other Town
C	Lugazi	Small Town	Other Town
D	Mpigi	Small Town	District HQ
E	Njeru	Small Town	District HQ
F	Wakiso	Small Town	District HQ
G	Gayaza	Small Town	Other Town
H	Kabasanda	Small Town	Other Town
I	Kakira	Small Town	District HQ
J	Kakiri	Small Town	District HQ
K	Kamengo	Small Town	Other Town
L	Kira	Small Town	Other Town
M	Nabusanke	Small Town	Other Town
N	Nagalama	Small Town	Other Town
O	Nansana	Small Town	District HQ
P	Nkoko	Small Town	Other Town
Q	Mutagga	Small Town	Other Town
R	Katende	Small Town	District HQ
S	Nabusanke	Small Town	Other Town
T	Nabusanke	Small Town	Other Town
U	Nabusanke	Small Town	Other Town
1	Buwama	Large Village	
2	Miyana	Large Village	
3	Kiziba	Large Village	
4	Lukoma	Large Village	
5	Katosi Trading Ctr	Large Village	
6	Butambala Dist. HQ	Large Village	

NO	NAME	CLASS
10	Kalagala	Large Village
11	Kalagi	Large Village
12	Kabembe	Large Village
13	Nkokomjeru	Large Village
14	Buikwe	Large Village
15	Nakawuka	Large Village
16	new1	Large Village
17	new1	Large Village
18	Namataba 1	Large Village
19	Mbalala	Large Village
20	Kiyunga	Large Village
21	Nakifuma	Large Village
22	no name	Large Village
23	Namulonge	Large Village
24	Gombe	Large Village
25	Matala Maria	Large Village
26	Budde	Large Village
27	Mpambire	Large Village
28	Nsangi	Large Village
29	Kyengara	Large Village
30	Namataba 2	Large Village
31	Namagunga	Large Village
32	Kitega	Large Village
33	St Mary's College	Large Village
34	Magamega	Large Village
35	Mulingilile	Large Village
36	Bukoyo	Large Village
37	Mengo	Large Village
38	Mpunge	Large Village
39	Akright City	Large Village
40	Bujuko	Large Village
41	Buloba	Large Village
42	Kiwenda	Large Village
43	??	Large Village
44	??	Large Village
45	??	Large Village

Source: COWI A/S

The types of centres described include those identified and described under NPDP, KPDP, the Jinja Model Town PDP, Wakiso PDP and Entebbe PDP.

NPDP identifies a national settlement hierarchy with multiple levels that include a Capital, Regional Growth Pole, Sub Regional Growth Poles, Major Towns, Secondary Towns, Townships and New Towns.

Box 1: Centers identified in PDPs of Wakiso, Jinja and Entebbe

The PDPs of Wakiso, Jinja and Entebbe identify centres that should be included in the JKM Corridor plan.

Wakiso PDP identifies CBDs at the centres of the four Municipal Councils Entebbe, Makindye Ssabagabo, Kira and Nansana; district decenters at Kajansi, Kasangati, Masulita, Wakiso, Kyengera, Kakiri, Kasanje and Namayumba Town Councils; and local centers at Namayumba, Masulita, Kakiri, Wakiso, Mende Kalema and Bussi. Wakiso Centres are located in relation to the ring roads. For example, ring-2 includes urban peripheral towns such as Kakiri, Kasangati, Wakiso Kakiri, Namayumba, Masulita, Kajansi, Kyengera, Katabi and Kira; ring-3 includes rural periphery towns that include Masulita, Namayumba, Mende Kalema, Kasanje and Bussi.

The Jinja Model Town Physical Development Plan identifies several growth poles in peripheral areas that are within and outside the Greater Jinja Municipal boundary (Figure 52). These include one CBD at Jinja; centres at Bugembe, Budoonendo, and Mafubira; and growth centres at Kibibi, Lukola, Ivunamba, Namulesa, Bugembe, Ssaza Hqrs. The plan also identifies centers that are outside the city boundary such as Kirugu, Wakiso, Naminya, Kikub Amutwe, and Kakira TC Offices.

Entebbe Municipality PDP mentions that it includes a hierarchy of settlements (CBD & commercial, Intermediate and local centers) but these are not clearly marked in the plan. The plan includes two settlement areas that are separated by the airport with high-density residential use places adjacent to the commercial areas.

Centres need functions to justify their existence, and these can include shopping, entertainment, recreation, commercial services, governance and administration, and industrial production, as described in Figure 34 below.

Figure 34: Hierarchy of urban centers

TYPE OF CENTRE	DESCRIPTION
National Centre/Downtown Kampala	Downtown Kampala already serves as a business, cultural and political hub of the country and the JKM region. It has the most intensive and dense form of development for both housing and employment, with high-rise development in its central business district. Centrally located in the KCCA region, the centre's role in finance and commerce, government, retail and entertainment should be strengthened.
Municipalities / Sub-Regional centers	Three municipalities (sub-regional centres) — Jinja, Entebbe and Mukono — are centres of industry, commerce and local government services, serving market areas of hundreds of thousands of people. Their sub-regional functions include education institutions, judiciary, hospitals, security services, and the like. They are the focus of transit and highway improvements. They are characterized by 2-4 storey, compact, employment and housing development served by high-quality transit.
Centres at industrial areas and freight/ferry terminals areas	Industrial areas and freight/ferry terminal areas may also serve as regional centers and provide the ability to produce and move goods in and out of the region. Access to these areas is centred on rail and the highway system.
Small Town Centers	Small town centres — provide localized services to tens of thousands of people within, say, a 3 to 5-kilometer radius, and possibly more. They feature 1-3 storey buildings for employment and housing. Town centres have a strong sense of community identity and are well served by transit. They have industries, commercial establishments, public recreational and cultural facilities, basic judiciary services and basic security services. There are presently 21 small towns in JKM.
Large Village Centers	There are present 45 large villages in JKM. They provide localized services similar to those in small town centers but scaled to serve 1,000 to 5,000 people within, say, a 1 to 3-kilometre radius. They feature 1-2 storey buildings for employment and housing.
Main street nodes	Main street nodes have a commercial identity but are on a smaller scale with a strong sense of the immediate neighbourhood. Main streets feature good access to transit. Examples include Main Street, Jinja; and Kampala Road, Kampala.
Transit-Oriented-Development (TOD) centers	Transit-Oriented-Development (TOD) neighborhoods are areas of development, approximately one kilometre in radius, centred around and within walk distance of a light-rail or busway station, that feature mixed-use development with a variety of shops and services that will remain accessible to bicyclists, pedestrians and transit users as well as cars. Densities are high adjacent to the station and taper off at the perimeter, encouraging people to ride public transportation. TODs have promise in the transport corridors tentacles of the KMR.
Mini Neighborhood centers.	Mini-neighbourhood centres are places that allow formal and informal shops and services, such as staple groceries, household supplies, coffee shops as well as community gardens. They could be promoted in neighbourhoods that are now primarily residential and take advantage of vacant land and under-used buildings.

Growth-and-Activity Centres

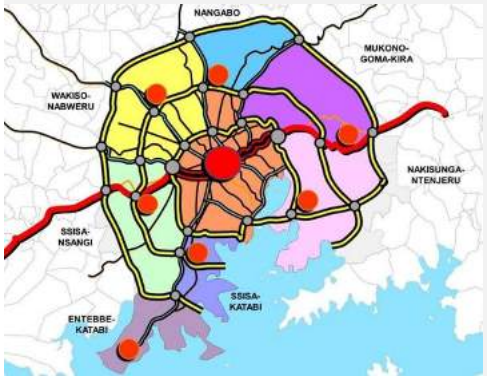
Growth-and-activity centres (GAC) may be defined as (i) places where future growth may be designated and encouraged and (ii) places of largely non-residential activity, including residential, commercial, industrial and mixed-use development — not solely residential development.

GACs come in multiple sizes. They include those in the centre hierarchy advocated in the Kampala Physical Development Plan (KPDP) (see Box 2) as well as suburban multi-use centres, redevelopment areas and new TODs. We identify existing and potential GACs in three ways: (i) city/town scale centres based on built-up areas; (ii) local activity centres using clusters of large buildings; (ii) functional activity centres using clusters of commercial and industrial points from OSM.

Box 2: KPDP activity centres

The KPDP advocates a metropolitan hierarchy of four levels: central zone, metropolitan zone centres, quarter centres, and local centres. The central zone serves the whole metropolitan area. Metropolitan zone centres serve the planning zones and include, Wakiso-Nabweru, Nangabo, Mukono-Goma-Kira, Nakisunga-Ntenjeru, Ssisa-Katabi, Ssisa-Nsangi and Entebbe-Katabi. Depending on the level in the hierarchy, the centres will serve multiple functions such as commerce, employment, health, sports, community services and emergency and police.

Service centres in KSPA Metropolitan Planning Zones



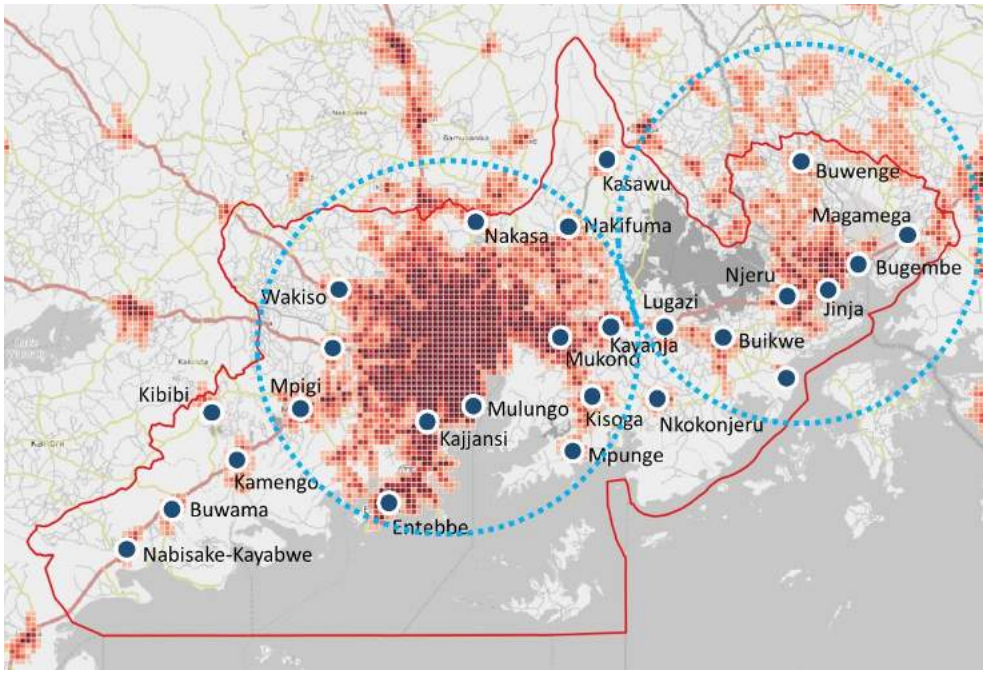
KPDP City Planning Zones (Quarters)

Source: KPDP

City/Town Scale Growth and Activity Centres in JKM

We identify 26 GACs in the JKM Corridor Region by linking high-density cell clusters with the set of place names from various sources (Figure 35). The location of these 26 is important in terms of (i) proximity to Kampala and Jinja core and (ii) proximity to the Northern Corridor. By the first metric, twelve GACs are located within the Kampala metropolitan development circle, eight are within the Jinja metropolitan development circle — only six are independent of the circles – although two (Kasawu, Nkokonjeru) are a few kilometres short. By the second metric, 14 GACs are on the roads of the northern corridor, strengthening its economic value.

Figure 35: City/Town Scale Growth and Activity Centres



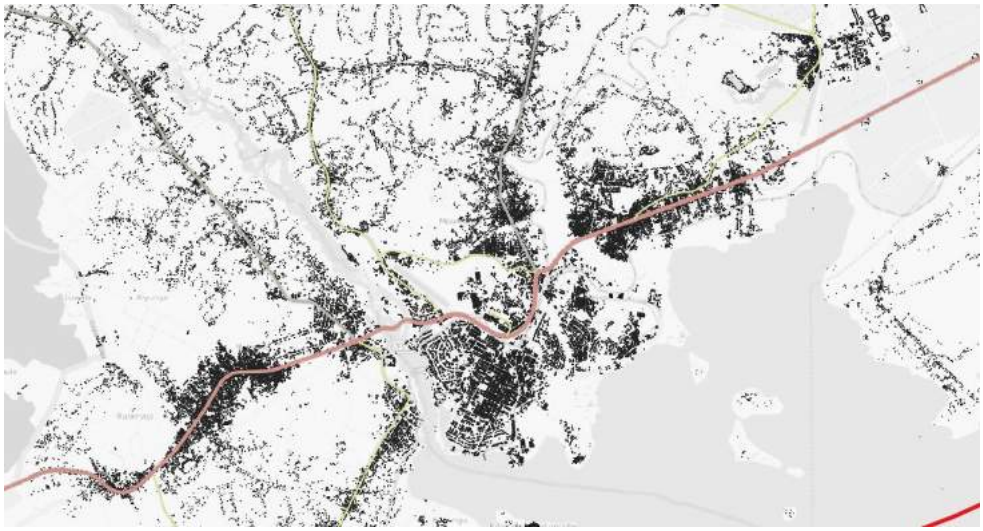
Source: COWI A/S

Local Growth and Activity Centres

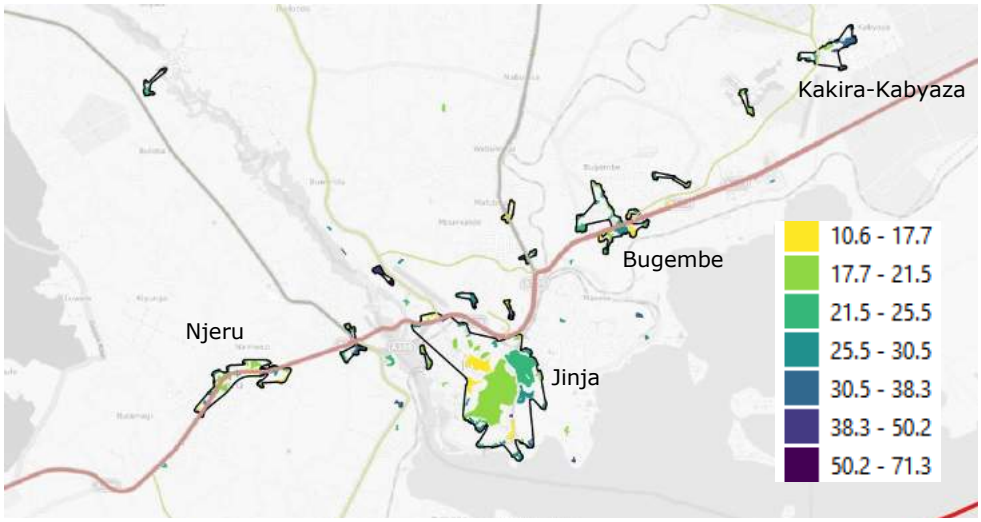
Existing areas with clusters of larger buildings with high plinth-to-area ratios are likely to be activity centres or have the potential to become activity centres. We identify these centres using a process that we illustrate in Figure 36 using Jinja City as an example. We start with Map 1, which shows the building footprints, where darker areas have the most buildings. Then, on Map 2, we use GIS analysis to identify the high-density building cluster that has larger buildings (>300 square meters) that are nearby, where the colours indicate the share of the polygon that is built-up. Finally, on Map 2, we use GIS to identify high-density building cluster groups.

Figure 36: Local Growth and Activity Centres in Jinja

MAP 1
BUILDING FOOTPRINTS



MAP 2
HIGH-DENSITY BUILDINGS CLUSTERS



MAP 3
HIGH-DENSITY BUILDING CLUSTER GROUPS

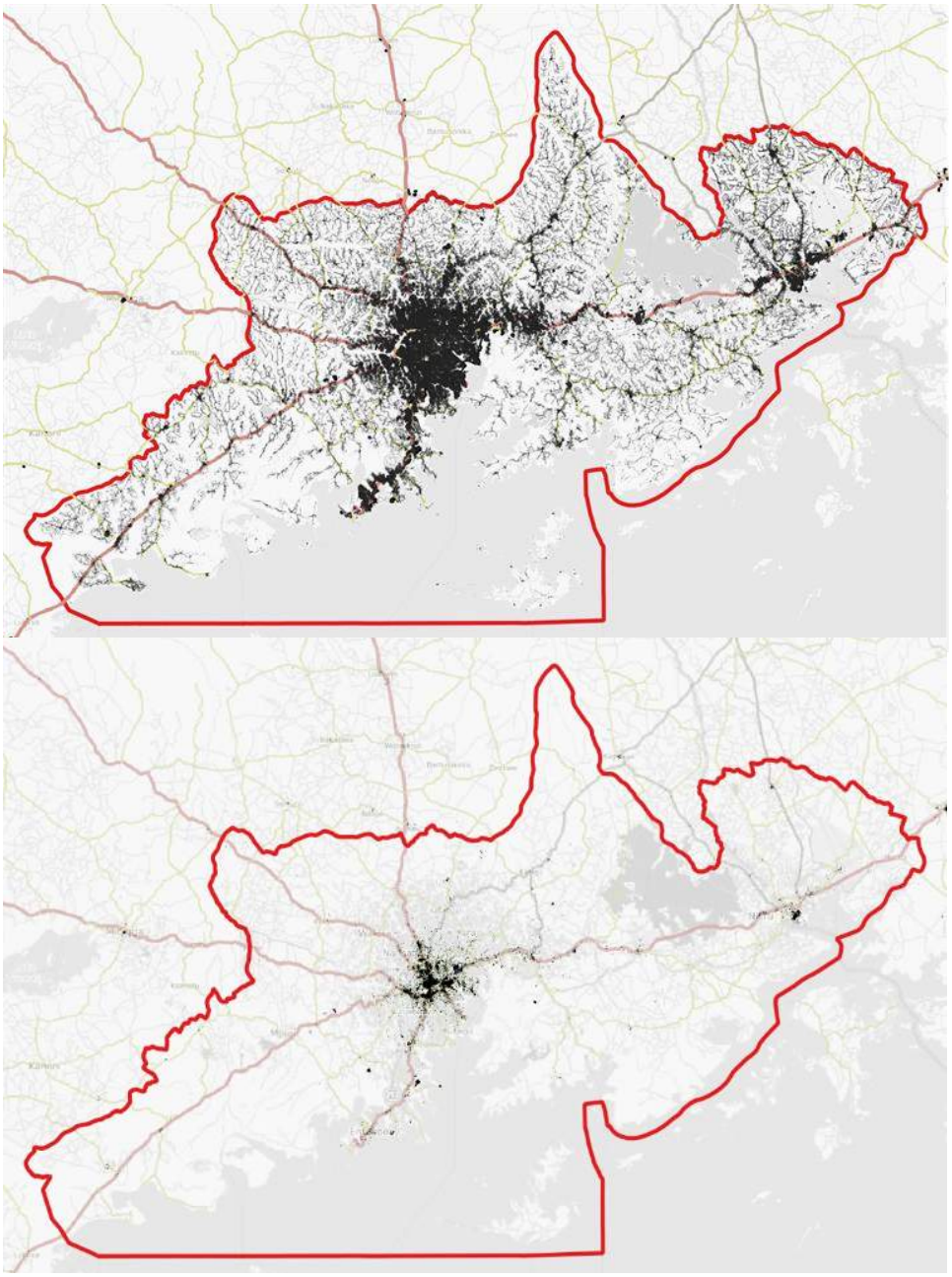
Source: COWI A/S

Figure 37 shows the high-density building clusters in the Kampala core.

Figure 37: Local Activity Centres in Kampala Core

MAP 1
BUILDING FOOTPRINTS

MAP 2
HIGH-DENSITY BUILDING CLUSTER GROUPS



´Source: COWI A/S based on Bing Buildings

Function-Based Activity Centres

Activity centres need functions to justify their existence, and these can include shopping, entertainment, recreation, commercial services, governance and administration, and industrial production. But data on the distribution of functions is scarce. Two available data sources are the Open Street Map (OSM), and the Census of Business Establishments (2002 and 2011).

Based on OSM, Figure 38 shows that industrial (map 1) and commercial (map 2) points tend to concentrate in GKMA, along the Kampala-Entebbe corridor, and along the Kampala-Jinja corridor, in Mukono, Kayanja, Lugazi, Njeru, Jinja and Wabulungu Trading Centre.

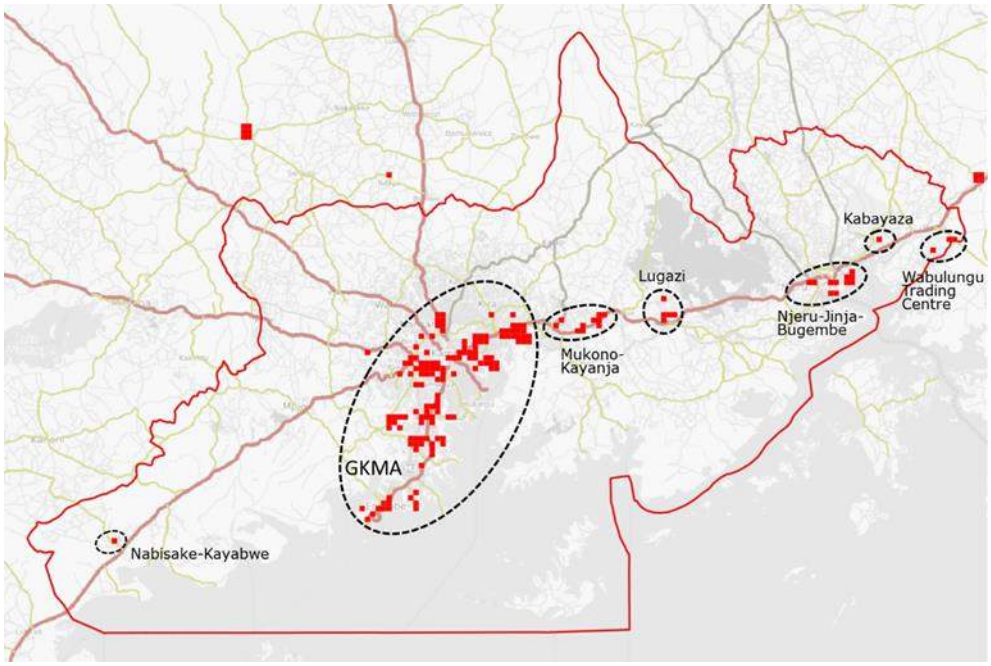
Figure 38: Areas with Industrial and Commercial Places (OSM)

MAP 1
CELLS WITH INDUSTRIAL PLACES

There are 7 clusters of cells with industrial points.

The largest cluster is centrally located in GKMA.

All but one of the other clusters is east of GKMA.

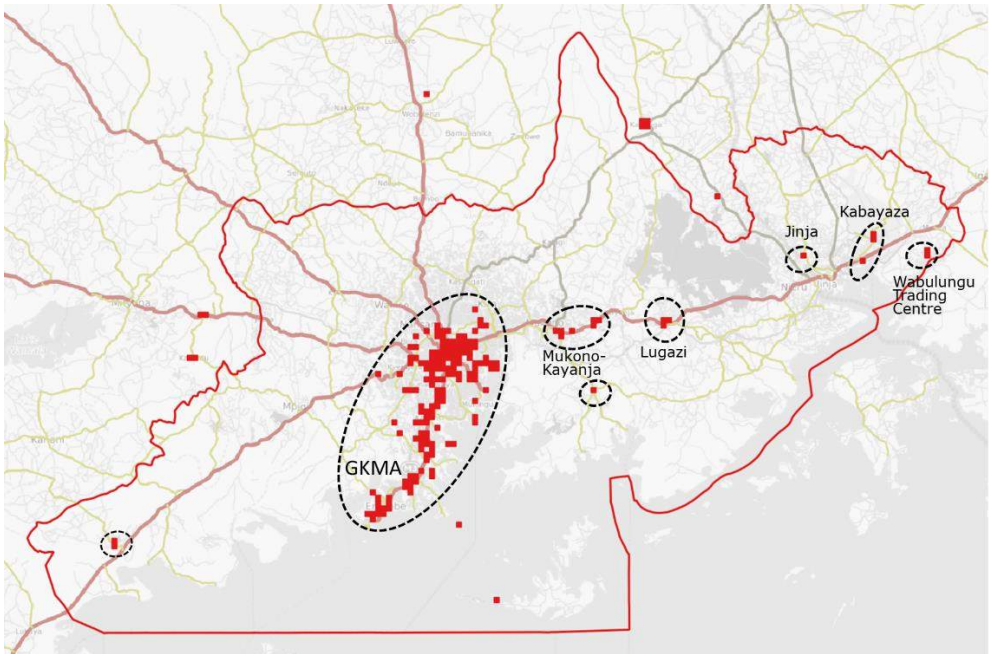


MAP 2
CELLS WITH COMMERCIAL PLACES

There are 8 clusters of cells with industrial points.

The largest cluster is centrally located in GKMA.

All but one of the other clusters is east of GKMA.



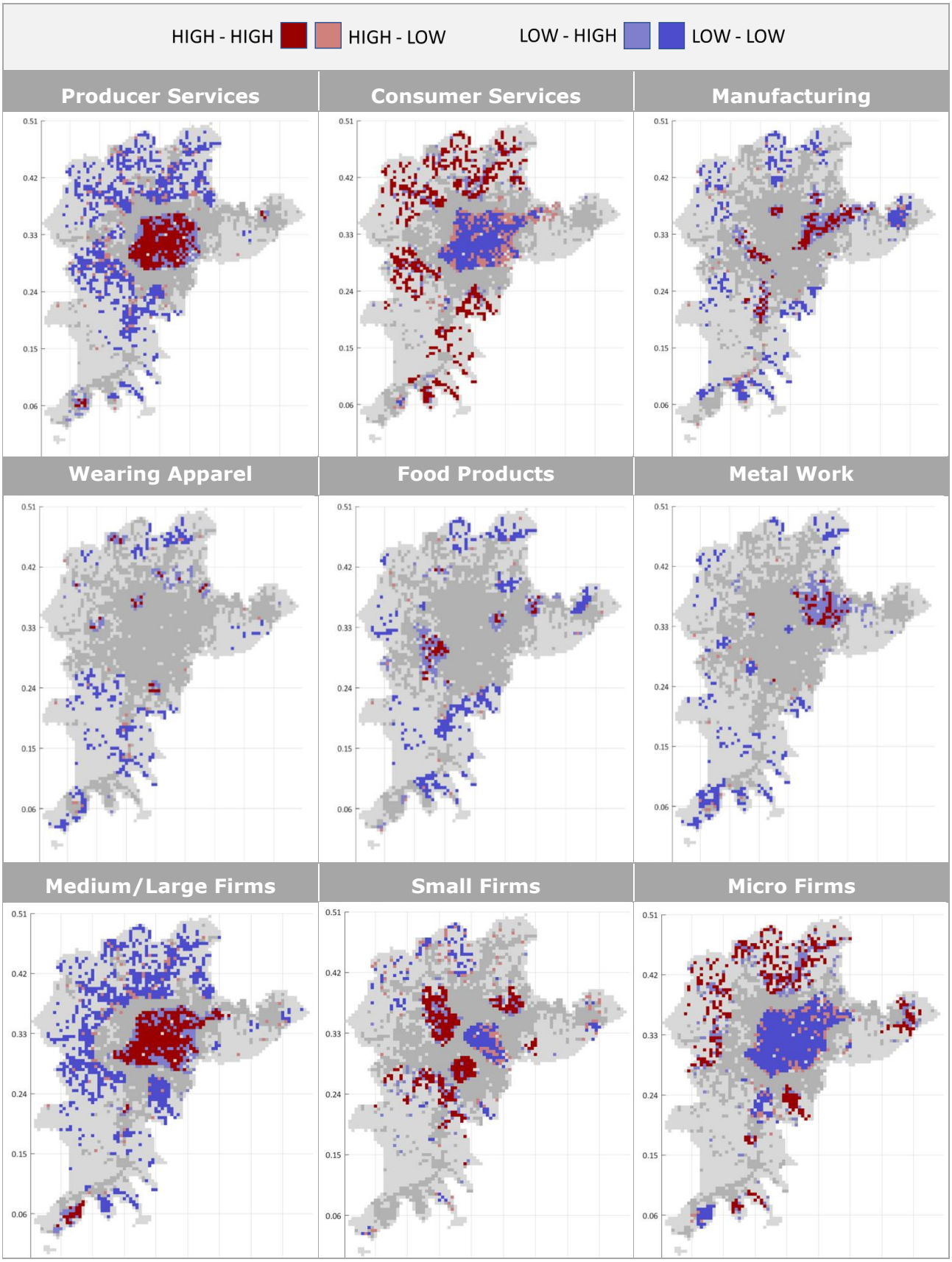
Source: COWI A/S derived from Open Street Map

A finer grain understanding of the spatial distribution of firms, but limited to GKMA, was provided by a presentation to the Uganda Economic Growth Forum in 2019.[40] The presentation stressed that, in Greater Kampala, which generates two-thirds of Uganda's GDP, most firms are small (average 2.37 workers), and that consumer service firms and workers far outnumber those of producer services and manufacturing. Key spatial findings were that:

[40] The presentation was delivered by Julia Bird, with Tony Venables and Tom Hierons on 22 August 2019 entitled Firm Clustering in (Greater) Kampala: How can the capital become a sustained growth centre for Uganda, based in an analysis of Census of Business Establishments (2002 and 2011) and Number of employees, ISIC, exact location points,

- Jobs tend to concentrate in the CBD, near Entebbe and the road to Jinja.
- Sectors locate differently: consumer services are dispersed, producer services cluster near the core, and manufacturers according to their subsector.
- Manufacturing and producer services favour areas with formal tenure systems, and close to main roads.
- Entebbe airport area is more attractive to consumer and producer services and less so for manufacturing.
- Manufacturing is internally concentrated (72 percent of firms are in food products, metal products, furniture, and apparel) and clustered — wearing apparel in the north, food products in the east and west in, and metal fabrications in the core and south.
- Larger firms prefer freehold land and proximity to a major road while small and micro firms by choice or otherwise, are on informal land areas and more distant.

Figure 39: Clusters of firms by type and size



Source: Bird, Venables, Hierons, 2019

3.5 Scenarios for future population and land use in the JKM Corridor to 2030 and 2040

Scenarios are conceptual images of the future and suggest possible ways it might develop. They help to focus stakeholder discussion on development options, test the impacts and outcomes of these options, and use the findings to inform and generate a preferred option.

3.5.1 Description of three scenarios

This section presents three scenarios for the future growth and development of the JKM corridor over the next ten and twenty years, to 2030 and 2040, respectively. These scenarios are (i) **continued dispersed development**, (ii) **concentrated development** and (iii) **embracing polycentric development**. The scenarios are presented to help stakeholders imagine *what could happen*, generate ideas and reach a consensus on *what should happen,* and then define *how to make it happen*.

Scenario 1 – Dispersion, or "business-as-usual", or "trend", assumes that JKM continues the trends of the recent past well into the future without modification. Urban growth will continue largely unplanned. If stakeholders do not wish to see the dispersion scenario materialise, then they will need to do different things and do things differently that in the past.

Scenario 2 – Concentration aims to *concentrate new development in the existing urban area footprint* in order to (i) create compact urban areas and (ii) preserve the region's natural systems and commercial agricultural areas, among other aims. Kampala's position as Uganda's primate city will be reinforced. This scenario will require a high level of planning, management, implementation, and control.

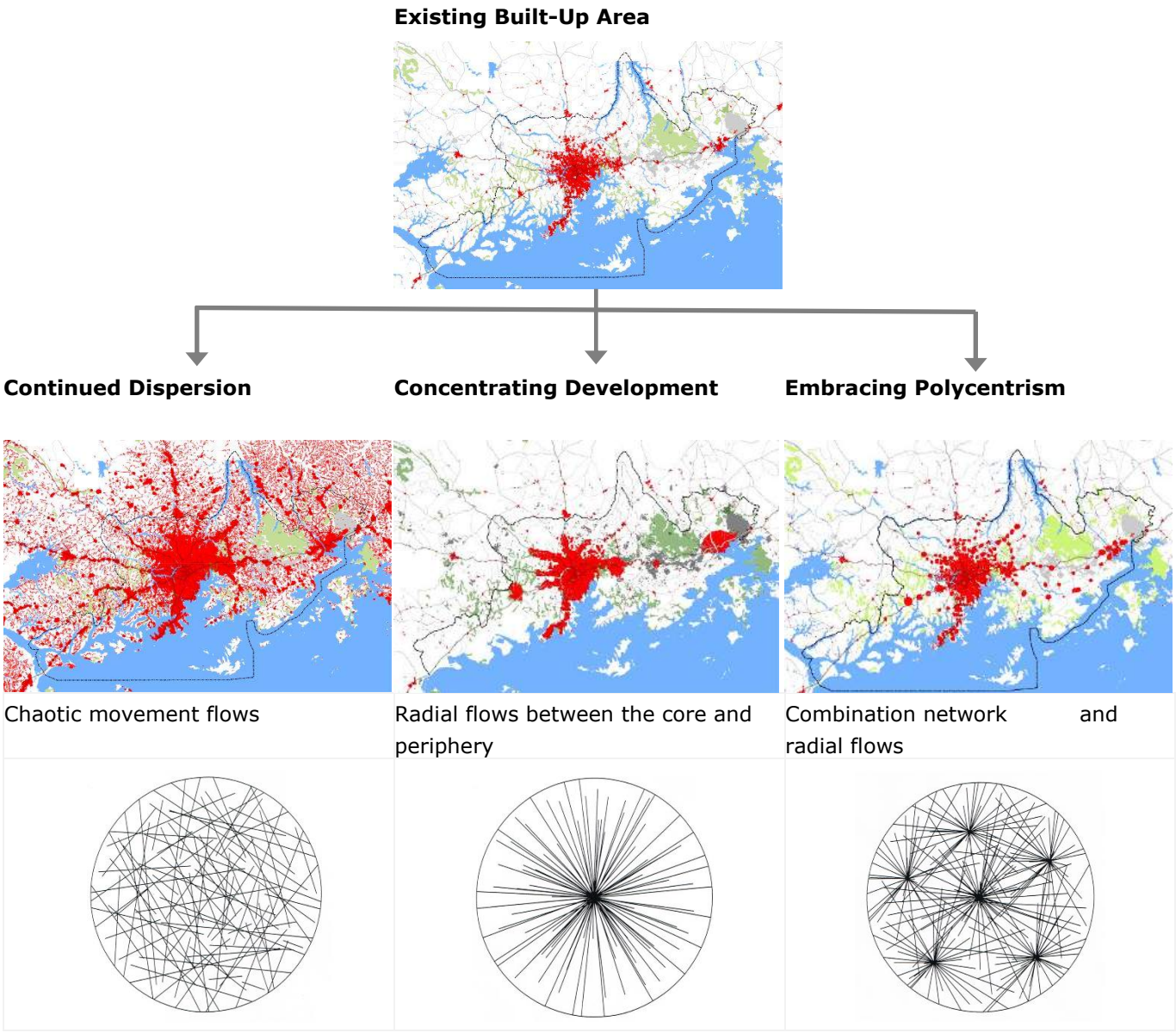
Scenario 3 – Polycentrism encourages growth in growth areas, corridors, activity centres, and with increased emphasis on redevelopment. Kampala will still be the largest city but will be supported by a network of secondary and tertiary cities. The scenario will also require high levels of planning, management, implementation and control.

A quick way to characterise these scenarios is by the general direction of growth: dispersion grows out, concentration grows up, and polycentrism selectively grows up and out.

While the scenarios are spatial in nature, they have a wide range of implications for the potential achievement of economic, equity and environmental goals.

Figure 40 shows the existing situation in terms of urban built-up areas and the built-up areas in 2040 under three scenarios, and a simplified diagram of the transportation system and likely movement patterns.

Figure 40: Three Scenarios for JKM in 2040

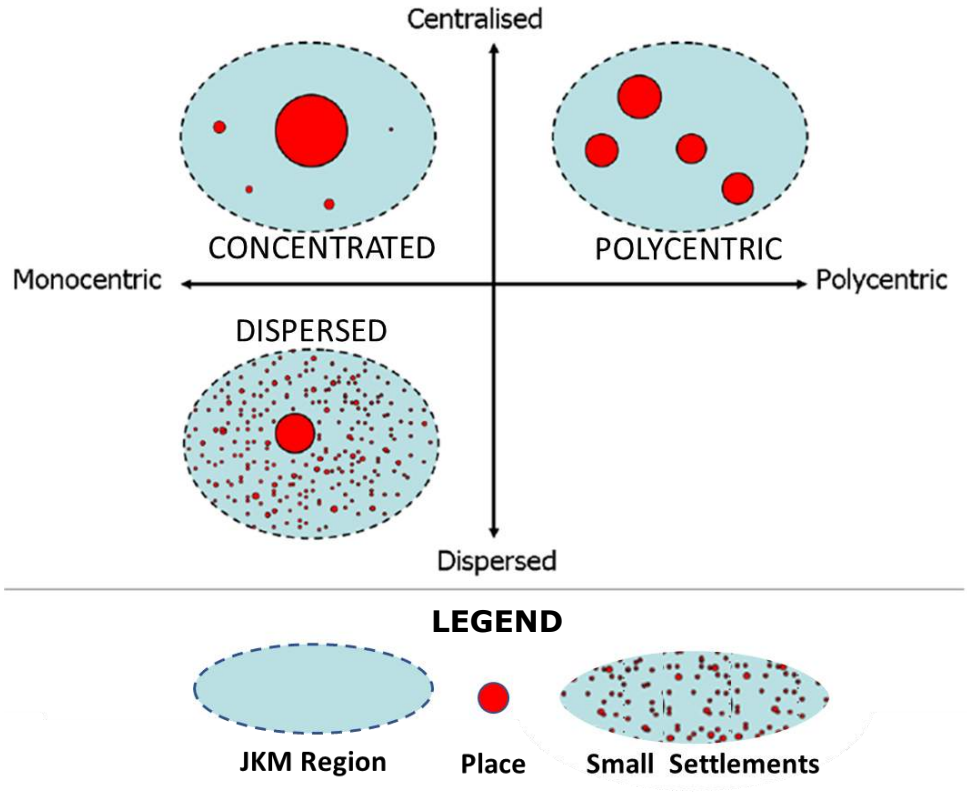


Source: COWI A/S

The three scenarios may also be positioned in a matrix defined along two different dimensions of the regional form: a monocentric-polycentric dimension and a centralised-dispersed dimension (Figure 41).

The concentrated scenario strongly promotes centralised, monocentric growth in the largest city (Kampala) but allows contained growth in a small number of secondary cities (Jinja, Entebbe). The dispersed scenario is one of dispersed-monocentric growth, allowing growth to continue in the largest city and go where it wants to. And the polycentric scenario is one of polycentric-centralised growth, promoting a strong network of primary and secondary cities.

Figure 41: Dimensions of regional form



Source: COWI A/S based on GaWC Research Bulletin 330; Environment and Planning A, 42 (6), (2010), 1383-1402

3.5.2 Datasets Used for Scenarios

We developed these scenarios using multiple datasets including built-up area images derived from remote sensing, building footprints derived from remote sensing, and past and projected population growth figures from UBOS. These are discussed below.

Building footprints

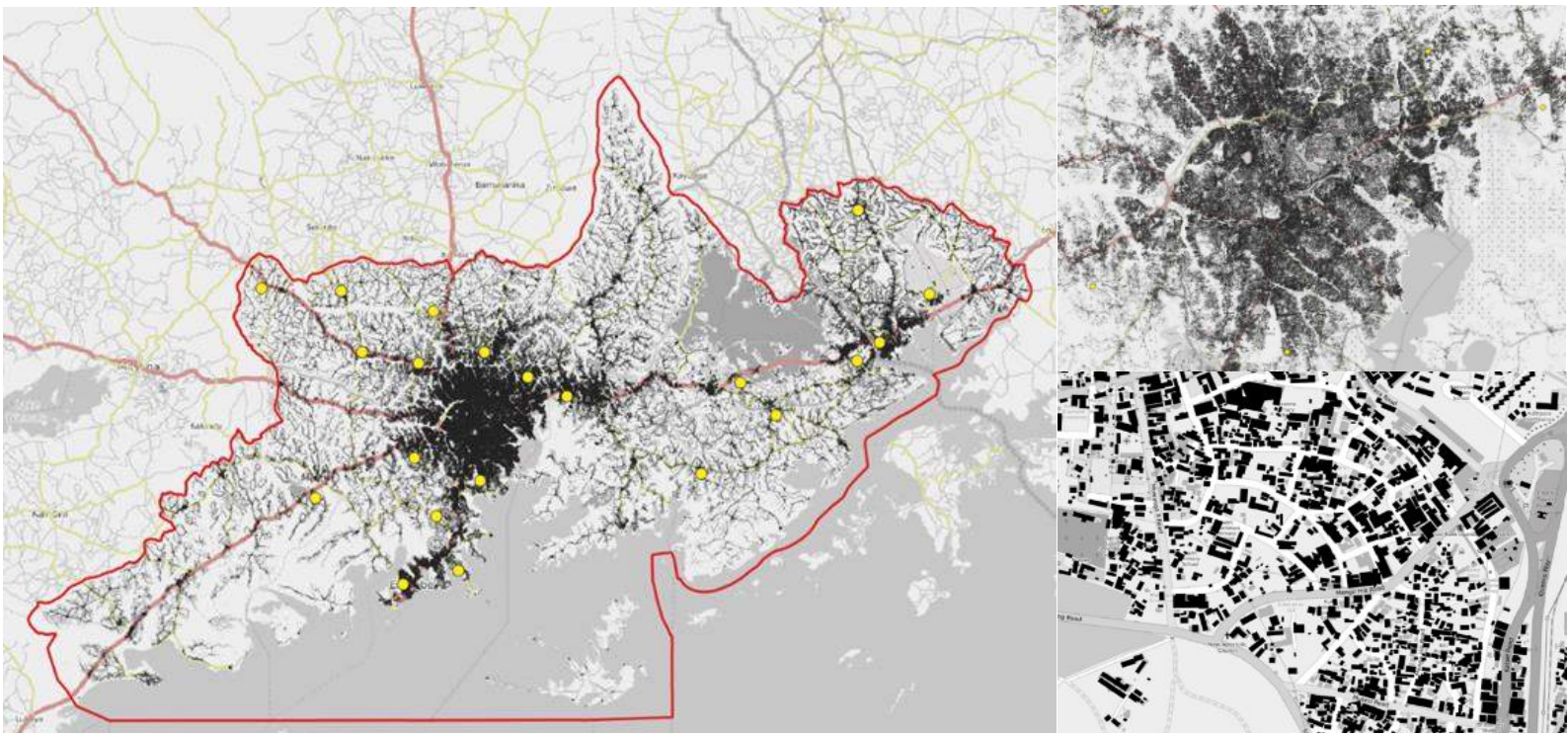
A building footprint is the shape of a building as seen from the sky. The density of a group of building footprints is the sum of individual building areas divided by the total area of the group. Where buildings are packed close together — the map is darker and more solid — the area is of higher density. The size of a building's footprint is an indicator of its use; smaller footprints are likely to be residential structures; larger footprints are more likely to be commercial, institutional, or industrial.

We use two shape-file datasets for building footprints. One, obtained from Microsoft,[41] is based on automatic, artificial intelligence recognition from a photo. The other, Open Street Map (OSM), is based on data from land offices and crowd-sourcing. Because the two datasets differ, we combined them and removed the OSM buildings that overlapped.

[41] https://www.microsoft.com/en-us/maps/building-footprints. Microsoft has generated high-quality building footprints leveraging Artificial Intelligence. It detects building footprints from the Bing search engine imagery. Operators removed noise and suspicious data and applied a polygonization algorithm to detect building edges and angles to create a proper building footprint.

Our analysis of the building database found that almost all of the JKM Corridor territory has some buildings on it —except for areas near watercourses, the lake and national parks. At a smaller scale, the ratio of building footprint areas to an area of analysis — such as a block, neighbourhood, cluster, or district — helps to identify potential growth and areas and nodes. Figure 42 shows building footprints at different scales: JKM, Central Kampala, and precinct in Kampala CBD

Figure 42: Building Footprints at different scales



Source: Bing Building Dataset 2018

3.5.3 GRID3 Uganda Settlement Extents[42]

As presented previously, CIESIN at Columbia University provides a set of analysed building footprints. The dataset, to reiterate, consists of three feature classes — built-up areas (BUA), small settlement areas (SSA), and hamlets (hamlets). These are defined as follows:

3.5.4 Future Population and New Growth Drivers

The three scenarios are based on the UBOS population projections for 2030 and 2040. For the sake of comparison, we assume that all three scenarios will grow at the rate projected by UBOS. Nevertheless, the scenarios will likely attract different types and levels of investment and different types and numbers of people —which will impact the total population size.

We can expect that new growth drivers will influence the distribution and size of the total population in JKM. For example, Jinja, now a city, may attract more investment and population than it would have had it remained a municipal area. The possible development of new towns — Sisa–Nsangi Satellite City, Mpatta Satellite City, Nsangi New Town, and Ntenjeru New Town — may attract population from places both within and beyond the JKM Corridor area. Finally, the set of known and unknown public and private

[42] GRID is Geo-Referenced Infrastructure and Demographic Data for Development.

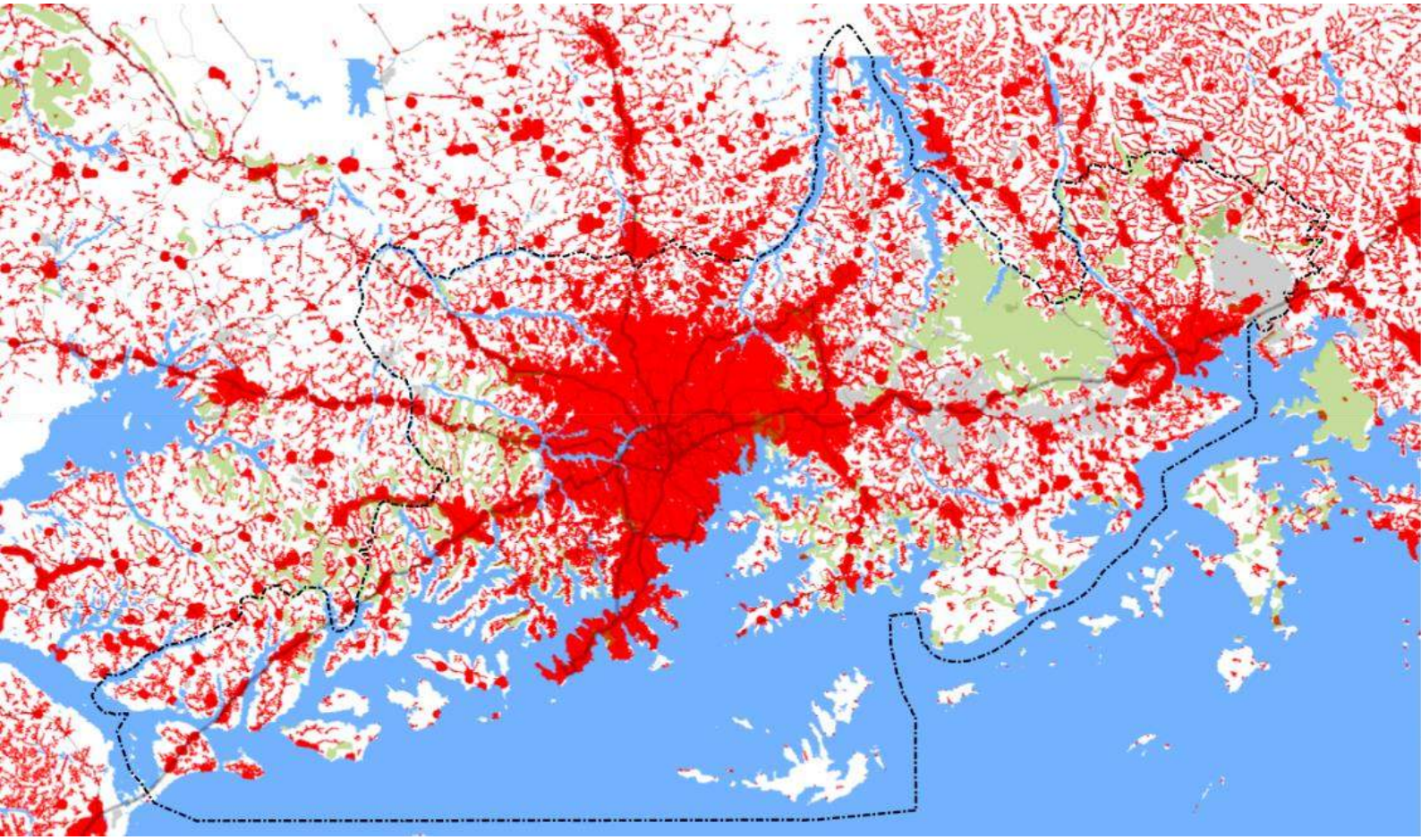
projects may attract additional new private investment, development and new population. A key example is the Kampala Industrial and Business Park, located at Namanve in south-eastern Kira Municipality, in Wakiso District.

3.6 Scenario 1: Continued Dispersion

3.6.1 Characteristics

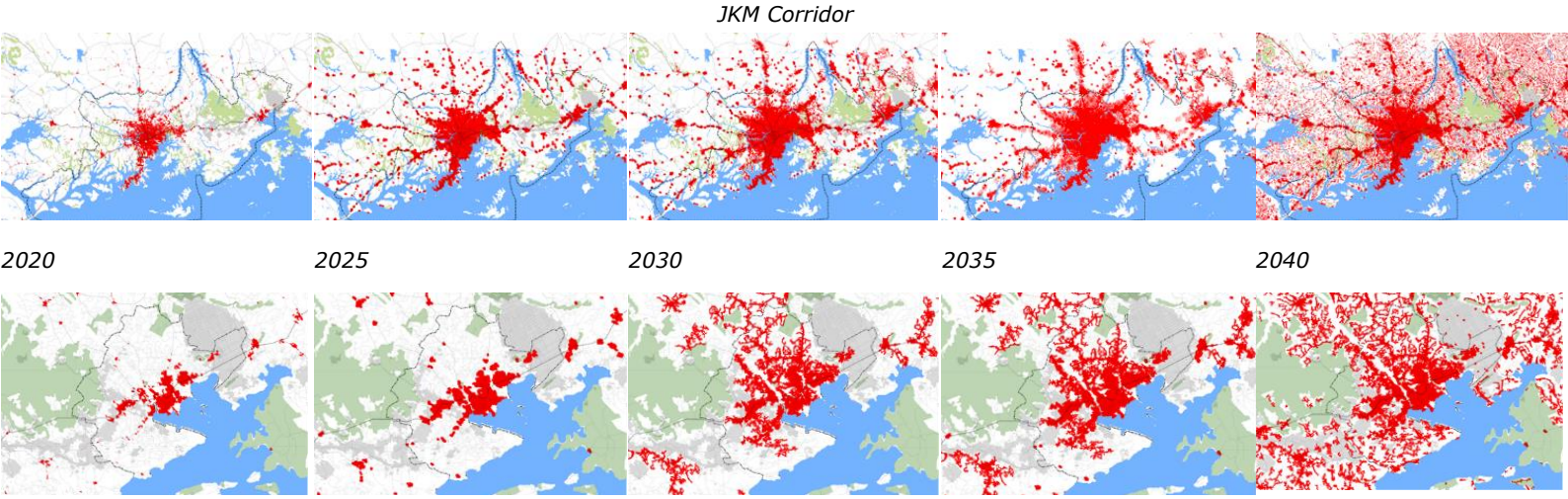
Scenario 1: Continued Dispersion - assumes that existing policies and practices that influence development will remain unchanged and that the historically dispersed, low-density development trend will continue unabated until 2040. This scenario may also be called a *trend* scenario or *business-as-usual*. Under this scenario, JKM's built-up area in 2040 may look like Figure 43.

Figure 43: Scenario 1 – Dispersion - JKM Corridor Dispersion at 2040



Source: COWI A/S

Figure 44: Time series of built-up area growth



Source: COWI A/S

Figure 44 above shows how this scenario may unfold over time in the JKM Corridor and Jinja in each five-year period between 2020 and 2040.

Under this scenario, based on evidence of dispersion, we believe that new growth will largely take place on greenfield sites, at the urban fringe, adjacent to main roads, and near rural settlements – favouring those near urban areas. To a lesser extent, some new infill and multi-storey development will also spring up in existing urban built-up areas, including informal areas.

Without explicit policies to control it, dispersed development will be haphazard and fragmented. Development will "leapfrog" — skipping over underdeveloped areas and sites — resulting in accelerated expansion and wasted development opportunities.

Small, scattered neighbourhoods will emerge, most lacking improved infrastructure. Low densities will not justify public transport and commuting will be slow and costly. The neighbourhoods may endure years if not decades of construction, as the best sites are built at first, others much later only after financing is found. Average built-up densities will decrease, as the "built-up" area expands faster than the population. Critically, this scenario consumes more land than other scenarios.

3.6.2 Implications

A dispersed development scenario may have the following economic, social and environmental impacts, as evidenced in scores of studies:

Economic and fiscal implications

Dispersed populations will need new infrastructure and services. But the greater the dispersion, the higher the cost of planning, building, operating and maintaining this infrastructure. It also makes investments in alternative modes — walking, cycling and public transit — more expensive and so less feasible.

Development may be fragmented, with the best sites developing first, shrinking the supply of easily developable land. Developers may not provide paved roads, power and other infrastructure until the development is built-out, leaving early occupants to endure or provide their own.

Dispersion will increase the average distance between households and existing commercial and employment centres. Over time, to address this shortfall, some new commercial and job centres may emerge, but likely not to the size, number and quality.

Job seekers will find fewer job opportunities within a reasonable commuting distance, some workers will spend more time and money commuting. Others will react by buying, or more frequently using, their own car, trading the extra expense for a reduced commute time. Still, others, shunning a long commute, will settle for closer but less lucrative jobs.

Firms will see the size of the labour market shrink and may have to pay more to attract good talent. More distant supply chains will increase transport costs. The potential to attract a new, particularly young, population may decrease with increased distances from shops and jobs. Shoppers will be less likely to travel to existing commercial centres, and these centres may start to decline higher levels of congestion and poor-quality infrastructure and housing. Overall jobs may grow at a lower rate owing to a lack of plans, policies and infrastructure.

Dispersion will increase the need for more roads and the low densities will not justify investment in public transport.

In summary, a dispersion scenario may have the following economic and fiscal impacts:

- Increased need for infrastructure
- Higher infrastructure costs
- Increased commuting time and cost
- Less specialisation of firms
- Lower overall job growth
- Tourism industry damage
- Increased personal transportation costs
- Increase risk and damage from floods
- Increased private costs and risks.

Social (mobility, health, education) implications

Dispersion is linked with reduced mobility and access, particularly by poorer households without own cars and low commute budgets. Households will be from and less likely to engage with and benefit from public amenities such as schools, hospitals, and government offices.

With spatial dispersion, especially where roads are poor, people and firms remain separated from each other and from economic opportunity. Neighbourhoods are poorly connected and thus cannot interact with as many people as in a city with higher exposure. High fragmentation means that population density varies widely, which increases infrastructure costs and increases travel times.

Dispersion is linked to poorer health outcomes. Increased car use is linked to obesity, traffic injuries and fatalities, respiratory illnesses and financial stress. Individual households will be more isolated and, with emergency response hindered by distances, at greater risk of breaches in security, natural disasters or accidents.

Dispersed development is less inclusive and less diverse. Lacking agglomeration efficiencies, commercial centres tend to be similar and bland. Low-density school districts may lack student numbers for efficient class sizes; efficient-sized school districts will need to be larger but making walking or cycling to school impractical.

Yet dispersed settlement may provide some benefits. For the middle class, they lend themselves to gated communities offering more safety and security. Disease transmission may be attenuated in low-density dispersed settlements. The larger plots offer greater opportunities for subsistence farming. In some cases, dispersed low-density settlements have less congestion, more affordable housing, and lower consumer costs (Gordon and Richardson, 1997; O'Toole, 2009). Dispersed development may result in less expensive land in outlying areas, which increases the affordability of larger houses on larger lots. In some countries, lower-density, dispersed suburbs have better school systems, and lower crime rates.

In summary, a dispersion scenario may have the following social impacts:

- Degraded human health
- Increase traffic congestion and traffic-related injuries/fatalities
- Social fragmentation
- Decreased neighbourhood quality
- Degraded, noisy surroundings
- Reduced diversity
- Decrease in social capital
- Increased economic disparity
- Delays in emergency medical services response times

Environmental implications

Dispersion consumes large quantities of land and requires the removal of more trees and natural ground cover. It results in a large loss of open space, parks, wildlife habitats and farmland. It disturbs the ecological balance and reduces biological diversity, rainwater infiltration, and groundwater replenishment. Farmland may be indirectly loosed when low-density development increases the price of land and farmers sell out to developers. The dispersed development pattern requires more water consumption and energy consumption, Environmental. It also results in increased water pollution and air pollution.

In summary, the dispersion scenario implies mostly growing out. Land consumption is high. Travel distances are longer, and costs are high. Low densities discourage and preclude investment in public transport and non-motorised options. Car ownership and use go up, along with congestion and greenhouse gas emissions.

3.7 Scenario 2 – Concentrated Development

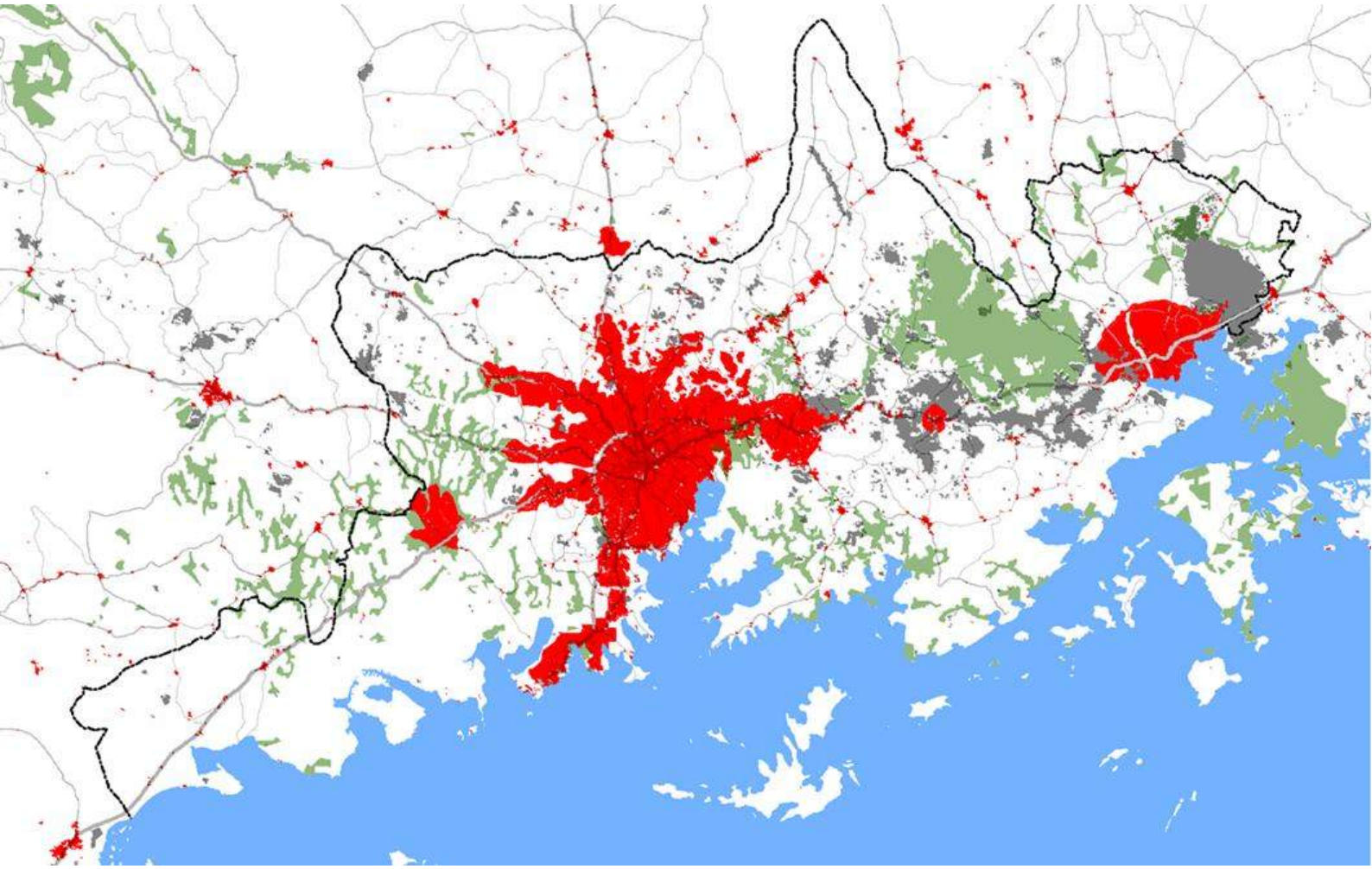
3.7.1 Characteristics

Scenario 2: Concentration – envisages a more centralised and monocentric urban region. It requires that governments at all levels develop supportive policies, practice strong development planning, and implement these plans — to restrict expansion and eliminate uncontrolled sprawl. The development will largely be directed to the existing urban structure and the largest and most dense centres. Urban areas will be compact. Figure 45 depicts the built-up area in the JKM Corridor in 2040 under the concentration scenario. Figure 46 provides a time series of images showing how the dispersion scenario may unfold in

JKM over two ten-year periods between 2020 and 2040 and how the scenario may unfold in Jinja over four 5-year periods.

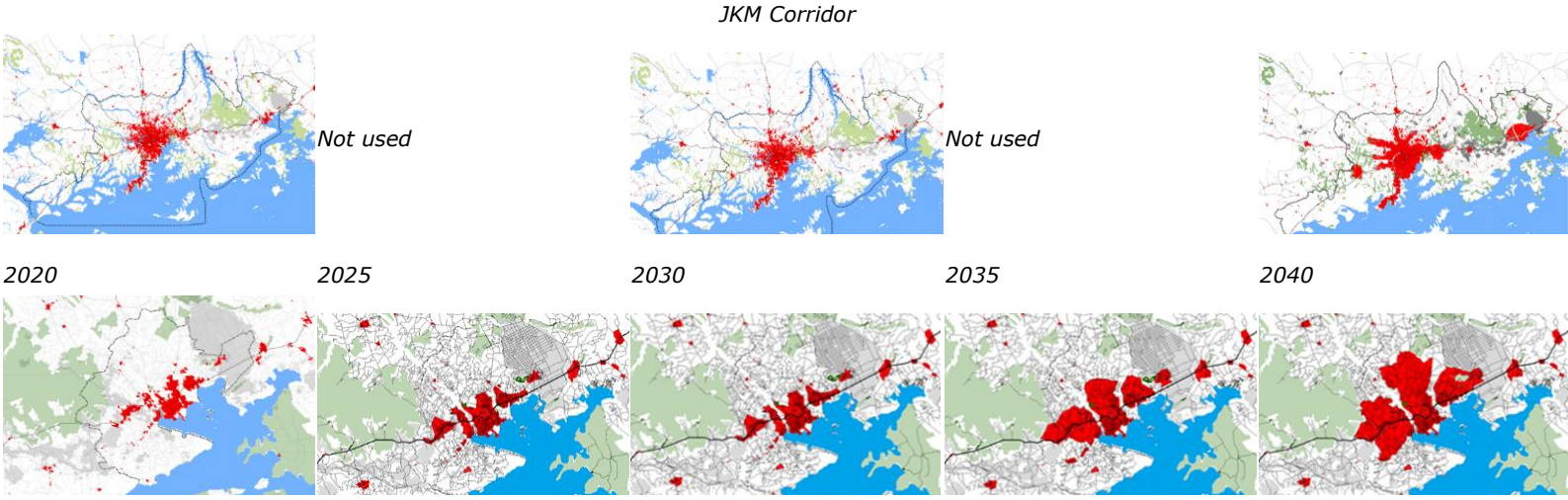
Development will comprise infill development on vacant plots, redevelopment of existing plots at higher floor-to-area ratios and higher plot coverage, and will limit the expansion of development into greenfield sites. Expansion areas will be constrained by an urban growth boundary.

Figure 45: Scenario 2 – Concentration - JKM Corridor at 2040



Source: COWI A/S

Figure 46: Time series of built-up area growth



Source: COWI A/S

Scenario 2 is similar to the preferred model for future growth as presented in the Draft, Wakiso, Physical Development Plan (2018-2040) report, prepared by the Wakiso District Local Government (2017), and discussed in Box 3.

Box 3: Preferred future growth model in the Draft Wakiso Physical Development Plan

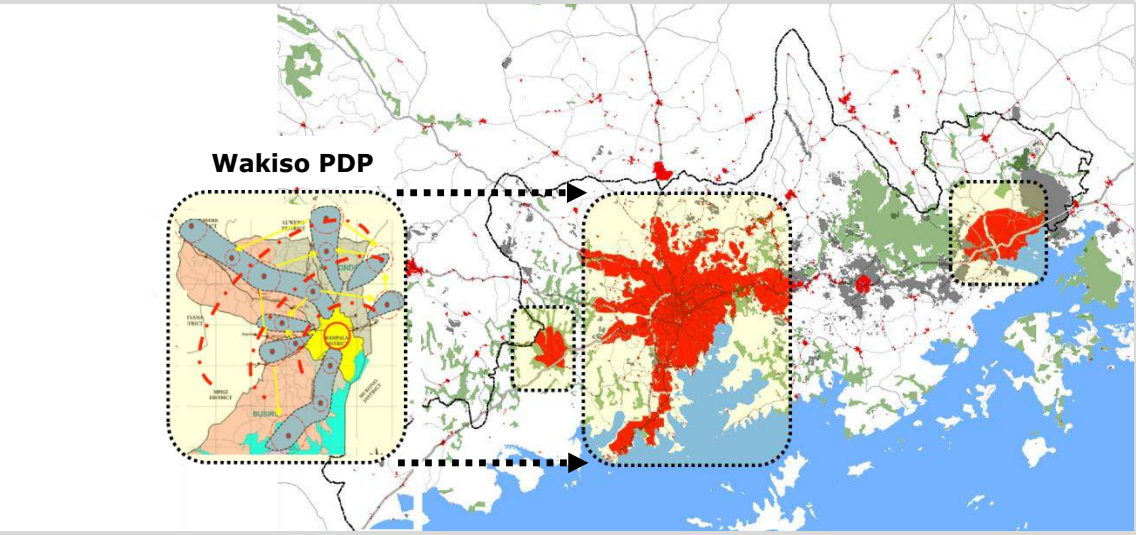
By 2040, with strict controls, the built-up footprint for GKMA may be that described in the Wakiso PDP. The PDP considers three scenarios for future population growth in the district. Based on different population growth, in-migration rates and intervention policies, these scenarios are the business-as-usual, worst-case scenario, and best-case scenario. Business as usual assumes no regulation of migration, the worst case assumes accelerated immigration, and the best case assumes regulation and decreased migration. The scenarios have different growth rates and end-year populations: population under business-as-usual grows at 6.6 percent and reached 10.5 million by 2040, under the ideal case it grows by 3.3 percent and reached 4.6 million, and under worst best case it grows by 5 and reaches 7 million.

The PDP consider the strengths and weaknesses of three spatial growth models: (i) independent satellite towns; (ii) urbanised belt; (iii) transport corridor/wedge. The PDP consultant analyses these models and formulated a fourth model (iv) integrated radial/satellite town model. This model has the following features:

- A metropolitan area with a defined urban limit.
- A wedge-shaped buffer area between Kampala City and Wakiso District and between Wakiso District and the outlying districts of Mukono, Luwero, Nakaseke, Mityana and Mpigi.
- Planning, managing and strengthening the existing cores and centres of Nansana, Wakiso, Kakiri, Namayumba and Masulita, along Hoima road, Kyengera along Masaka

road, Kira along Jinja road; Kasangati, Gayaza and Kiwenda along Gayaza Zirobwe road; Makindye–Sabagabo, Kajansi, Katabi and Entebbe along Entebbe road.

- Links between the above urban centres, Kampala City, Business Centre Districts and the outlying districts.



Source: COWI and Draft Wakiso Physical Development Plan

3.7.2 Implications

The three greatest advantages of this scenario are conserved land, compact development, and higher densities.

Conserved land could remain in or be developed for agricultural production, be safeguarded to ensure viable ecosystem services, or be developed for recreational uses.

Compact development patterns offer lower costs to the public for roads, water, stormwater management, sewage treatment, solid waste management and other infrastructure and services. Compaction offers more diverse mobility options — particularly public transport, walking and cycling — and time and money saved in commuting and waiting in traffic. It results in lower kilometres travelled, higher transit ridership, lower fuel/energy consumption and greenhouse gas emissions. It is associated with reduced pedestrian and motor vehicle fatalities, increased physical activity and reduced obesity, reduced household transportation costs, increased upward social and economic mobility and increased social interaction and neighbourliness.

Compact development supports geographic concentrations of specialized firms, industries, and institutions. When these are collocated, they can share labour and other productive inputs and generate productivity, efficiency, and knowledge spillovers.

Higher densities will offer a wider choice in housing type, mixed-use neighbourhoods, more vibrant streets and public spaces, and more accessible shops and entertainment facilities. Higher densities will support the development of "15-minute neighbourhoods" where households can walk to most of the

shops and services they require. Higher densities also support the funding of public transport. This in turn will attract businesses, investors and talented job seekers who benefit from a more productive environment.

When one considers the cost of transportation as part of a household budget, shorter commuting distances between work and home will improve housing affordability.

Executing this scenario will require a combination of strategies. These will include restrictions on greenfield development, development cordons, and greenbelts. It will require the development of vacant lots, greyfield land [43] and brownfield land[44]. Developing brownfield sites, which include abandoned, underused or contaminated properties will help to reduce noxious environmental impacts, but may be riskier and more time-consuming. Infilling and developing grey field sites will strengthen the surrounding neighbourhoods and take advantage of the infrastructure already in place.

Dwellings and plots may be smaller, and buildings taller and cover more of their plot area. Transportation demand management will replace the build-more-roads agenda, including disincentives for motor vehicle ownership and use, parking restrictions, and investments in non-motorised and public transport such as light rail and busways. Infrastructure designed for lower densities will need upgrading or replacement.

This scenario implies that job growth and population will be accommodated in the existing built-up areas, mostly in Kampala, Jinja and Mpigi growth areas and in other municipalities with the strongest transport connections to the core. Population growth will be concentrated near places of high industrial and commercial employment.

Under a concentration scenario, existing informal settlement areas will experience greater pressure to redevelop, with some risk of gentrification. The scenario will require aggressive policies to limit displacement from informal housing areas and expand affordable housing. The more limited area for development would enable developers to cross-subsidize affordable housing with market-rate housing in urban areas.

Compact development may reduce infrastructure costs and development pressure on green spaces and agricultural land.

Most existing built-up areas have room to grow. There are vacant lands and plots and redevelopment capacity around the major roads. There are older shopping centres and car-oriented corridors that could be transformed into well-designed mixed-use centres. Vacant residential plots can accommodate infill development; under-developed plots can accommodate new rooms and dwelling units, and office and industrial buildings can also be redesigned office for to house more people and jobs.

One disadvantage of the concentrated development scenario is that large lots of land for industrial uses are not typically considered.

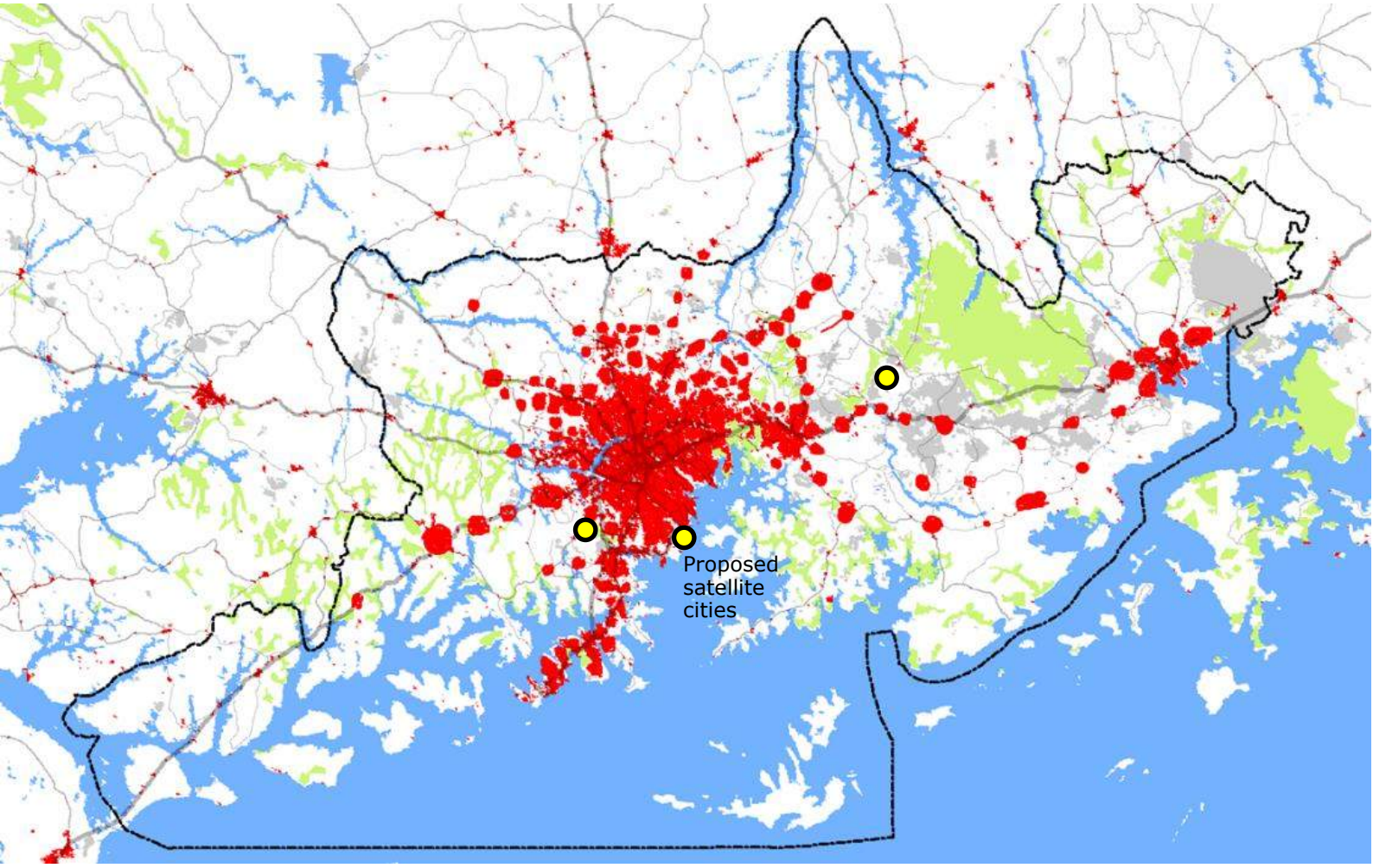
[43] Greyfield land is economically obsolescent, outdated, failing, or underused real estate assets or land.
[44] Brownfield land is previously developed land that is not currently in use that may be potentially contaminated.

3.8 Scenario 3 – Polycentrism

3.8.1 Characteristics

This polycentric scenario combines features of the dispersion and concentration scenarios. It assumes that most of JMK's growth can be guided into prioritised polycentric entities – sub-corridors, centres and nodes – with the balance unfolding in a more dispersed pattern. Development will largely follow the existing regional structure and spread along the primary access routes to urban centres. Radial road structures will be strengthened in the JKM subregion and the Jinja sub-region.

Figure 47 depicts the built-up area in the JKM corridor in 2040 under the Polycentrism scenario, including the two proposed satellite cities. *Figure 47: Scenario 3 – Polycentrism – in JKM Corridor*

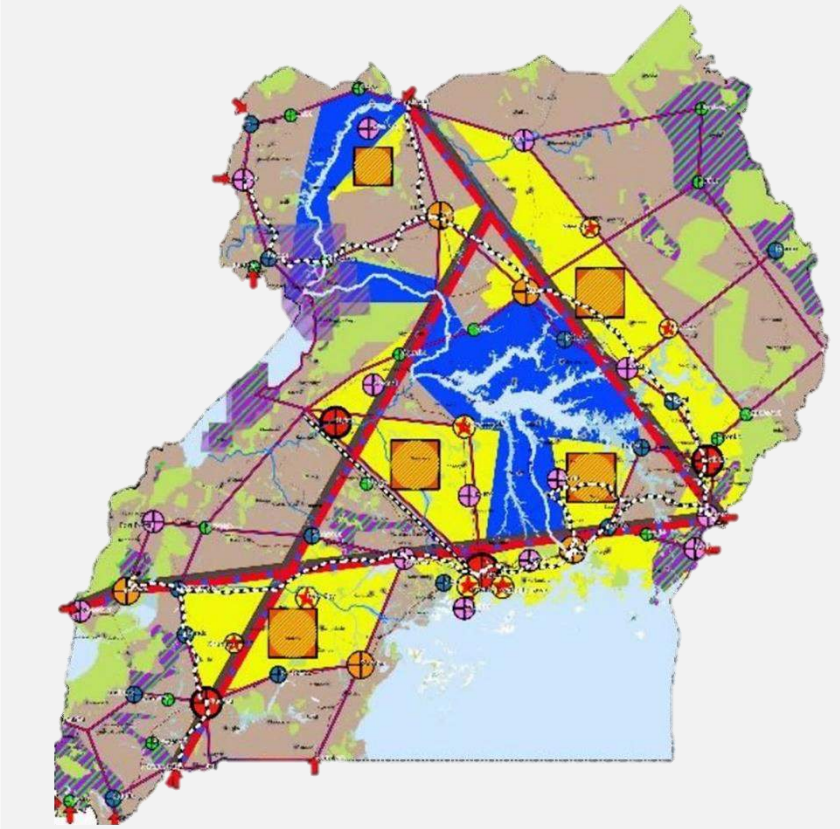


Source: COWI A/S

The scenario is informed by the spatial framework set out in the National Physical Development Plan, which is summarised in Box 4.

Box 4: Description and National Physical Development Plan

The scenario follows closely the framework set out in the National Physical Development Plan, which advocates a population-sized hierarchy of centres: the capital city, regional cities, sub-regional cities, urban settlements, major towns, and townships. NPDP also accommodates new towns, including satellite towns; border towns; and 'Rurban' (or peri-urban) towns. NPDP considered the spatial implications of six themes —economic, social, environment and tourism, agricultural, urbanisation and connectivity — and combined these into an "NPDP integrative scheme" or "Integrative Physical Plan" (IPP). IPP's planning concept is "regional growth of urbanised zones and corridors constrained by agricultural clusters and natural resources". At the national scale, IPP features a polycentric settlement system, a triangular expressway system, and a system of natural and agricultural areas. Within the JKM, the IPP



12

Source: National Physical Development Plan

Polycentric regions are advocated by international best practices, including ESPON, the European Spatial Planning Observatory and the American Planning Association. Accordingly, many studies have been undertaken to quantify the impacts of polycentric plans (see Box 5).

Box 5: Examples of Comparative Studies of Polycentric Regional Structures

There is evidence that these three forms are associated with different levels of economic performance and different quality-of-life indicators. For example:

- A recent study of 126 regional plans in the USA found that almost all had a polycentric structure, with a hierarchy of centres connected by high-quality transit. The study found that the most effective centres are those that score high on the so-called "D" variables — Density, Diversity, Design, Destination accessibility and Distance-to-transit.

- A study of USA metropolitan areas found that polycentricity is associated with higher labour productivity than a single monocentric region – perhaps because (i), there are fewer agglomeration diseconomies, such as congestion, pollution and fierce competition for land and workers and because (ii) smaller centres of a polycentric region "borrow" size from their neighbours, compared to a self-standing city of similar size.

- A study in the Netherlands found that polycentric regions had significantly fewer cultural, leisure and sports amenities than monocentric regions in which the urban population is concentrated in a single city.

- Another study[45] found that dispersed low-density regions had negative and positive attributes, depending on one's perspective. From one perspective, dispersed regions consume more land and infrastructure, provide fewer fiscal impacts, higher housing costs and personal travel costs and more automobile dependence. From another perspective it found that dispersed development offered safer neighbourhoods, appreciating housing values, and unrestricted use of automobiles.

Several studies found that doubling metropolitan size increases metropolitan labour productivity: one by over 10 percent, one by between 3 and 8 percent (Rosenthal and Strange, 2004), and an average of 5.4 percent (Melo et al. 2009).

Under the polycentric scenario, there will be a focus on identifying the best centres and developing local plans for these centres. The plans will focus on infill development, densification, and upgrading of infrastructure and services.

This scenario also allows for the development of new satellite towns and smaller nodes. This will build on existing and potential resources and opportunities; provide alternative development options and

[45] The Cost of Sprawl, Transportation Research Board, 2002

destinations for residences and new businesses, and support the transit-oriented-development (TOD) concept.

Planners will promote development in existing growth areas, corridors, centres and nodes, and identify opportunities for new areas, centres and nodes. These entities will be developed into a hierarchical system of centres that will include: Downtown Kampala, regional centres, town centres, sub-corridors and transit-oriented-development (TOD) neighbourhoods. Each centre will have a different menu of housing types, but all will have diverse, affordable housing options. All centres will encourage mixed development. In more detail, these are:

National Centre/Downtown Kampala serves as the business and cultural hub of the country and the region. It has the most intensive and dense form of development for both housing and employment, with high-rise development in its central business district. Centrally located in the KCCA region, the centre's role in finance and commerce, government, retail and entertainment may be strengthened.

Sub-Regional centres — examples are Jinja and Entebbe — are centres of industry, commerce and local government services serving a market area of, say, hundreds of thousands of people. Sub-regional functions include education institutions, judiciary, hospital, security services, and the like. They are the focus of transit and highway improvements. They are characterized by two- to four-storey compact employment and housing development served by high-quality transit.

Industrial areas and freight/ferry terminals areas may also serve as regional centres and provide the ability to produce and move goods in and out of the region. Access to these areas is centred on rail and the highway system.

Town centres — provide localized services to tens of thousands of people within, say, a 3 to 5-kilometre radius. They feature one-to-three-storey buildings for employment and housing. Town centres have a strong sense of community identity and are well served by transit. They have industries, commercial establishments, public recreational and cultural facilities, basic judiciary services and basic security services.

Sub-corridors are transport routes for people and goods. They are ideally served by public transit and are centred on roads rather than transit nodes. The corridors may be designed as mixed-use boulevards that encourage biking and walking and maximize transportation infrastructure. They may be lined with multi-family buildings, townhouses, shopping, and employment. Linear corridor settlement patterns enable development to be close and efficiently connected with linear infrastructures, such as roads, cycleways and rail and buses. Possible sub-corridors in JKM are identified in section 0, and we will identify commercial corridors in the next phase.

Main street nodes have a traditional commercial identity but are on a smaller scale with a strong sense of the immediate neighbourhood. Main streets feature good access to transit. Examples include Main Street, Jinja; and Kampala Road, Kampala.

Transit-Oriented-Development (TOD) neighbourhoods are areas of development, approximately one kilometre in radius, centred around and within walk distance of a light-rail or busway station, that feature mixed-use development with a variety of shops and services that will remain accessible to bicyclists, pedestrians and transit users as well as cars. The areas (mostly suburbs) around these communities may remain at the same densities as found in Dispersion Scenario. Densities are high adjacent to the station and taper off at the perimeter, encouraging people to ride public transportation.

In addition to the centres are the Primarily Residential Areas. Under the polycentric scenario, most of the existing neighbourhoods will remain largely the same, although some redevelopment may be permitted so as to put vacant land and under-used buildings to better use. New neighbourhoods will be planned with smaller single-family lots, mixed uses and a mix of housing types including row houses and accessory dwelling units.

3.8.2 Implications

The polycentric scenario envisages a moderate level of physical expansion, falling between the previous scenarios but closer to the concentration scenario. Like the concentration scenario, it calls for a fair amount of multi-storey development, redevelopment of brownfield sites, and infill development on vacant plots. This scenario strives to maximize growth accommodated through infill on previously developed lands and within existing urban areas.

This scenario's mixed-use — residential, commercial, office, and light industrial— development tends to reduce driving distances and congestion, and improve air quality. It provides the full range of housing types, from single-family detached to multi-storey towers, in a wide variety of locations and price options. The range of housing types in each centre is also determined by the type of centre: for example, larger and denser centres will have more multi-storey units.

To reduce energy consumption and greenhouse gas emissions, the scenario encourages non-motorised and public transport options and accommodates, but does not encourage, the use of private vehicles. Congestion, kilometres travelled, and public transport ridership will be moderate.

To preserve natural resources, the scenario promotes growth in areas that are already planned for growth and avoids development in areas that are in or near areas with natural resources, good agricultural land, parks and wetlands.

Places will be identified for the expansion of labour-intensive manufacturing and the growth of public sector facilities.

About half of new growth is accommodated as infill or redevelopment; the rest occurs on previously undeveloped land.

In summary, the scenario delineates where growth and investment are encouraged to achieve high-quality communities, enhance economic opportunity and sustainable infrastructure, and where it is discouraged and or prohibited to protect or restore the natural environment. It encourages the redevelopment of brownfield and greyfield sites and sites that are near to and can use existing infrastructure. It aims to create greater economic opportunities through place-making. It aims to provide a wide range of housing and transportation opportunities and to supply infrastructure more cost-effectively.

3.9 Scenario Assessment and Comparison

To compare the strengths and weaknesses of and trade-offs between the three scenarios, we prepared a comparative table. First, we identify a set of six performance criteria that relate to the vision and six goals for the JKM Corridor Plan, as quoted below.[46]

It has been decided by stakeholders that the vision that stakeholders craft should be ambitious and transformational. It must encourage and guide the necessary move along the trajectory from transport corridor to development corridor, in which wider benefits are shared more widely and equitably.

The vision should ultimately be one of a JKM Corridor in which economic opportunity, growth and trade are promoted, and are developed and realized in an inclusive and sustainable fashion for the benefit of all citizens of the corridor.

Inherent in such a vision is that the competitive advantages of all districts, cities and towns are better used in line with state-of-the-art global territorial development strategies. Moreover, JKM Corridor economic growth must further benefit all the people of Uganda through economic and spatial linkages to all national regions, and through regional integration and trade to a wider East Africa, principally through the Northern and Central Corridors – and then beyond, into the international sphere. In addition, all of JKM Corridor's human settlements – from the smallest to the largest villages, towns and cities – must become places of opportunity, rather than poverty.

From this vision emerge the six goals, which are, in short:

- Widespread economic growth and opportunity
- Equitable social development and housing
- Efficiently planned, regulated and managed land uses
- Enhanced mobility and connectivity
- Productivity-enhancing economic and municipal infrastructures and services
- A resilient and sustainable natural and urban environment.

For each performance criterion, we identify at least one corresponding indicator, with some criteria having multiple indicators. We score the performance of each scenario on each indicator, from 1 to 10 (low to high), based on our expert knowledge and literature review. Against each indicator, we offer an explanation for the scoring.

For example, for energy efficiency, we state that bigger and more compact cities are more energy efficient than smaller cities – based on studies that found the larger cities have more compact street patterns, natural building shadows offering solar shading, better thermal insulation, centralised mechanical and electrical equipment, shared utilities and fewer private car journeys.

Figure 48 summarises the comparative performance of each scenario. The performance assessment may stimulate discussion around the different scenarios, which may yield a hybrid scenario or refinement of the preferred scenario.

[46] See A129822 Draft WP1 (D3) Vision Goals and Guiding Principles

Figure 48: Comparison of Scenarios

VISION/Indicator	SCENARIO			ASSERTION
	Dispersed	Concentrated	Polycentric	
WIDESPREAD ECONOMIC GROWTH AND OPPORTUNITY				
promotes specialisation	1	2	3	polycentric + concentrated cities promote specialisation; shift from agri to industry.
economic growth	1	3	2	large cities more successfully compete to attract capital, firms and people.
global appeal	1	3	2	high profile cities attract international investment.
financial maturity	1	3	2	larger cities have more breadth/depth of financial sector, driving productive investment.
talent attraction & development	1	3	2	larger cities have more, high quality universities that provide highly skilled workers.
jobs (international)	1	3	2	larger cities attract more international companies, but hire less new employees.
jobs (local)	2	1	3	smaller cities will drive job growth for ugandan nationals, including lower skilled jobs.
efficiency of agricultural sector	3	1	2	dispersed small cities provide more support to agri industry and increase value-added.
rural market linkages	3	1	2	dispersed cities give rural households more access to urban markets, due to low travel times.
support to small businesses	3	1	2	dispersed cities provides more local support small business, located mostly in rural areas.
access to international markets	1	2	3	good access to international markets needs specialised port city.
exports	1	2	3	polycentric scenarios has lower export costs because closer to export routes.
EQUITABLE SOCIAL DEVELOPMENT AND HOUSING				
health	3	1	2	large cities have more air pollution, malnourishment, disease spread in slum areas.
access to local facilities	1	2	3	larger cities with large budgets = better infra: polycentrics plan in advance of population
income distribution	1	2	3	multiple urban centres distribute income more evenly that larger cities.
poverty reduction	1	2	3	more jobs opportunities in dispersed + polycentric due to easy access by rural poor.
creative culture	1	3	2	cultural vibrancy is higher in larger cities.
political representation	3	1	2	access to political representatives higher in a distributed model.
ENHANCED MOBILITY AND CONNECTIVITY				
prevalence of informal settlements	1	3	2	informal settlements more likely to appear in larger cities where population is less controllable.
transport efficiency	1	2	3	polycentrics have better developed road and rail networks to reduce transit times.
regulatory efficiency for business	1	3	2	larger cities have existing business support services - more difficult in dispersed model.
local government fiscal autonomy	3	1	2	dispersed cities have more control over finances and more local representation.
cost of public service delivery	1	3	2	public services cost more in dispersed populations; urban centres offer efficient delivery.
RESILIENT AND SUSTAINABLE NATURAL AND URBAN ENVIRONMENT				
ghg intensity of the economy	1	3	2	larger cities are more efficient; transport energy use per capita declines with size increase.
energy efficiency of economy	1	3	2	larger cities are more energy efficient, more compact + energy efficient.
environmental quality - air	1	3	2	dense cities less car-dependent, walkable, public transit friendly, better air quality.
environmental quality - water	1	3	2	dense cities make water treatment more viable.
environmental quality - noise	3	1	2	larger cities have more noise due to transport, industrial and construction activities.
forests + natural habitats	1	3	2	smaller cities are more sprawling and land-encroaching than one large city.
biodiversity	1	3	2	habitats damaged/destroyed + biodiversity lost when more land is consumed.
energy efficiency	1	3	2	larger cities, with denser, taller buildings are more energy efficient.
water use	2	1	3	polycentric and dispersed more water efficient than large city.
waste generation	1	3	2	waste is easier and cheaper to manage in bulk.
exposure to climate risks	3	1	2	large cities more exposed to natural hazards, reduced in many smaller cities.
vulnerability	1	3	2	large cities less vulnerable to climate+disasters due to better infra & protection capacity.
PLANNED, REGULATED AND MANAGED LAND USES				
connectivity between urban areas	1	2	3	clustered and polycentric models have the best transport links between cities.
social+economic activities co-located	1	2	3	polycentrics have more compact + mixed land use, which enables co-location of activities.
public space provision	1	2	3	pre-existing cities have less open space. planned cities can plan for open space.
access to housing	1	3	2	larger cities with large budgets = better infra: polycentrics plan in advance of population
cost of urbanisation & infra	1	3	2	polycentric cities have higher infra dev costs; large cities have infra already in place.
ECONOMIC AND MUNICIPAL INFRASTRUCTURES AND SERVICES				
access to clean water	1	2	3	larger cities with large budgets = better infra: polycentrics plan in advance of population
access to education	1	2	3	larger cities with large budgets = better infra: polycentrics plan in advance of population
access to healthcare	1	2	3	larger cities with large budgets = better infra: polycentrics plan in advance of population

Source: COWI A/S

3.10 Spatial Strategies

3.10.1 Introduction

This section presents the spatial strategies for the development and use of land in the JKM Corridor. The overall spatial strategy is to promote polycentric, concentrated, metropolitan growth while preserving and sustainably using the corridor's green-blue resources. The strategy identifies and supports a hierarchy of dispersed urban centres to absorb most of the future growth in a compact and concentrated way, provide room for expansion when it is shown to be necessary, and foster natural resource conservation and

protection. In line with the KPDP, the PDPDs of Wakiso, Entebbe and Jinja, the JKM spatial strategy elements are:

- Protect and conserve what is valuable. Protect, conserve, enhance and sustainably use natural assets — like water bodies, forests, woodlands, farmland, and open spaces — and cultural heritage resources. Protection refers to permanently keeping the assets safe from degradation and loss; conservation refers to consuming the resources slowly and only when needed.

- Make room for growth. Plan to absorb future growth in two ways: (i) in existing urban areas — through infill, taller buildings and increased densities and (ii) through new, delineated and developed expansion areas that are next to existing built-up areas (and do not leap-frog).

- Support metropolitan development. Structure growth in the two metropolitan regions — around Kampala and Jinga — to encourage economic and employment market integration and agglomeration. Discourage growth outside of these metro areas, except for limited places such as corridors between the two metropolitan regions. Keep the metros separate and do not allow their built-up areas to merge.

- Grow the centers. Encourage population growth in existing strategic growth centres through intensification and densification and discourage growth elsewhere. These centres are located throughout JKM, vary in character, are boundary-delineated, are planned for or possess infrastructure and services, and are capable of becoming complete communities.

- Avoid or limit growth in unsuited settlement areas. Discourage population growth in areas that do not have existing or planned services such as municipal water and wastewater systems (level 4 areas), are within green areas, or are close to hazardous or climate-change-vulnerable lands.

- Plan land use and infrastructure together. Encourage development in places with existing infrastructure, encourage the upgrading of existing infrastructure, and use infrastructure investment to guide expansion.

- Connect places where people live to places where they work. Connect living and workplaces through multi-modal transport systems including active transport, especially for low-income people.

- Improve access to housing, jobs and mobility. Housing options will be decent, diverse, and affordable for all income levels. Job opportunities will be abundant, with various skill levels to retain and attract a diverse economic base. Mobility will be efficient, multimodal and balanced.

- Encourage complete communities. These are communities with a diverse mix of land uses including residential and employment; with good access to stores, services, and public services; with a diverse range and mix of housing types; with good access to multiple transport options; with sufficient public service facilities; with sufficient and accessible open spaces and recreational facilities; and with healthy, local and affordable food options. They are also planned to mitigate and adapt to the impacts of a changing climate, improve resilience and reduce greenhouse gas emissions, and contribute to environmental sustainability. And they integrate green infrastructure and appropriate low-impact development.

3.10.2 Alignment with other spatial and physical development plans

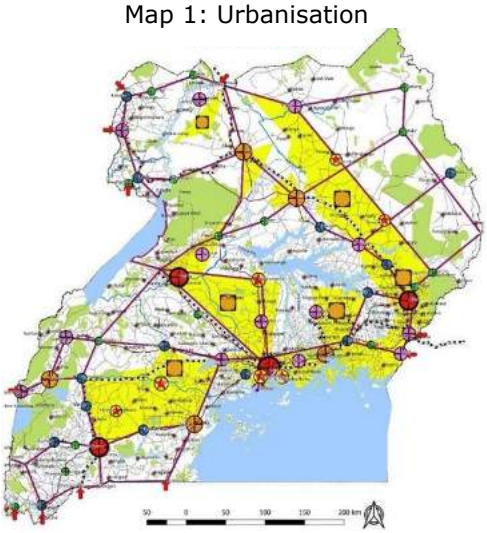
The JKM Corridor spatial strategy aligns with other key physical development plans including the National Physical Development Plan (NPDP), Kampala Physical Development Plan (KPDP), Wakiso Physical Development Plan (WPDP), Jinja Model Town Physical Development Plan and Entebbe Physical Development Plan (EPDP).

National Physical Development Plan (2019)

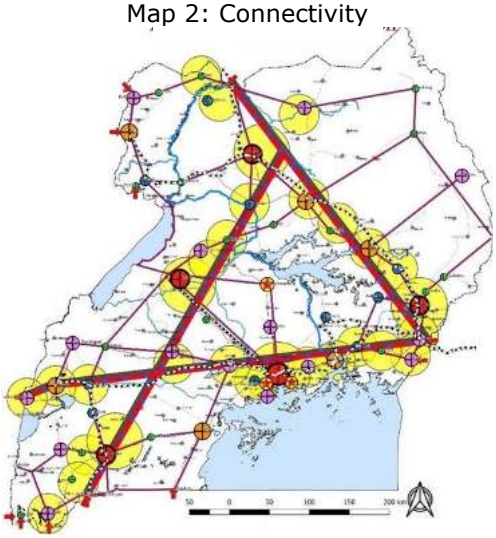
We align with the National Physical Development Plans' (NPDP) concept of spatial form, which is a "polycentric" settlement system, connected by a triangle of expressways, aligned with the agricultural zones and natural resources. Blocks. We accept the NPDP planning concept of urbanised zones and corridors constrained by agricultural and natural resources clusters. And in planning the JKM Corridor, we recognize that it is one of the three connectivity/urban development corridors of the national "Triangle" that aims to limit GKMA expansion, and protect areas and water systems.

Figure 49: Selected NPDP maps

Map 1: Urbanisation



Map 2: Connectivity



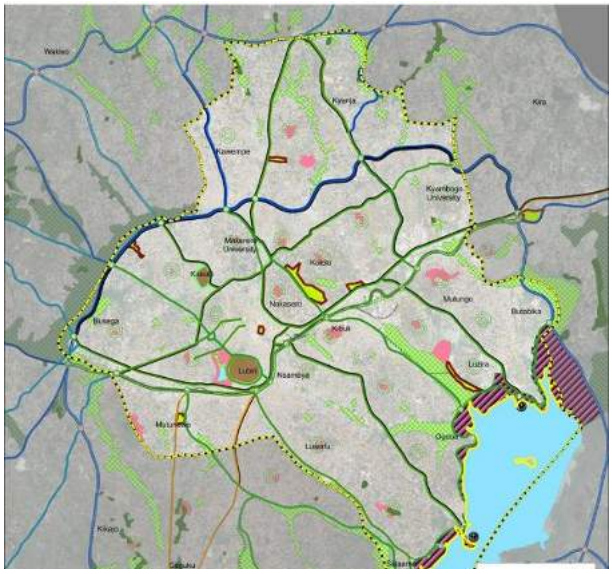
Source: NPDP

Kampala Physical Development Plan (2012)

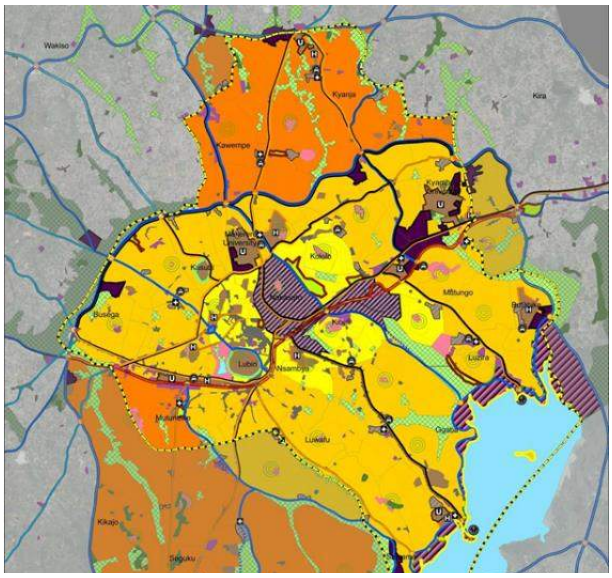
We reflect KPDP "Radial Integrated" spatial model in our support for KMR metropolitanism and growth along radial corridors and along inner, middle and outer concentric corridors. Like KPDP, we support population growth in the three existing urban cores of Mukono, Wakiso and Entebbe; in a hierarchy of other centres; in new satellite towns in the Ssaisa-Nsangi and Nakisunga-Ntenjeru area; and in Wakiso-Nansana as a potential growth area. And we support an east-west freeway through the city centre and an extensive BRT system along the existing corridors.

Figure 50: Selected KPDP maps

Map 1: Natural Resources and Open Space



Map 2: Integrated Land Use Plan



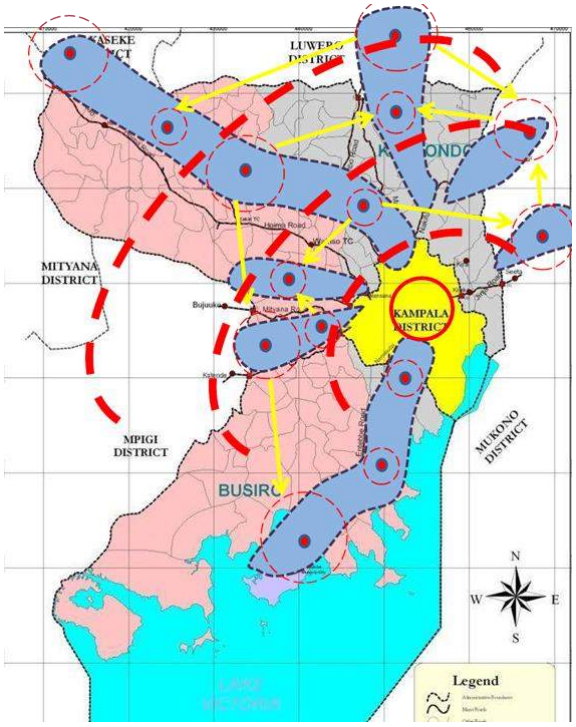
Source: KPDP

Wakiso Physical Development Plan (2018-2040)

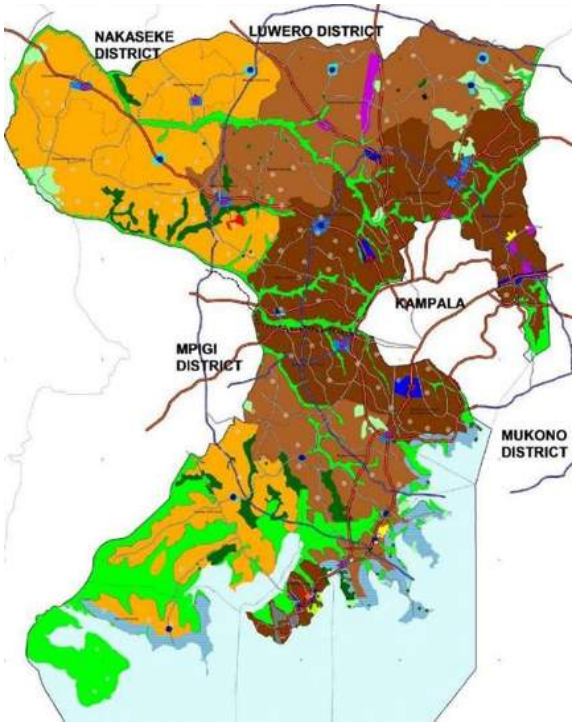
The Wakiso Physical Development Plan was based on the integration of three spatial models — independent satellite towns, urbanized belt, and transport corridor/wedge — into the Integrated Radial Satellite Town Model (Figure 51 Map 1). Key initiatives are urban centre strengthening; new town development; new and stronger transportation corridors with better links between centres; green infrastructure areas to stop urban sprawl between Wakiso and the neighbouring areas and between the urban centres within Wakiso District; and a corridor system of radial routes from Kampala City but terminated with a buffer along the extensive natural systems.

Figure 51: Selected WPDP Maps

Map 1: Integrated Radial Satellite Town Model



Map 2: Integrated Land Use



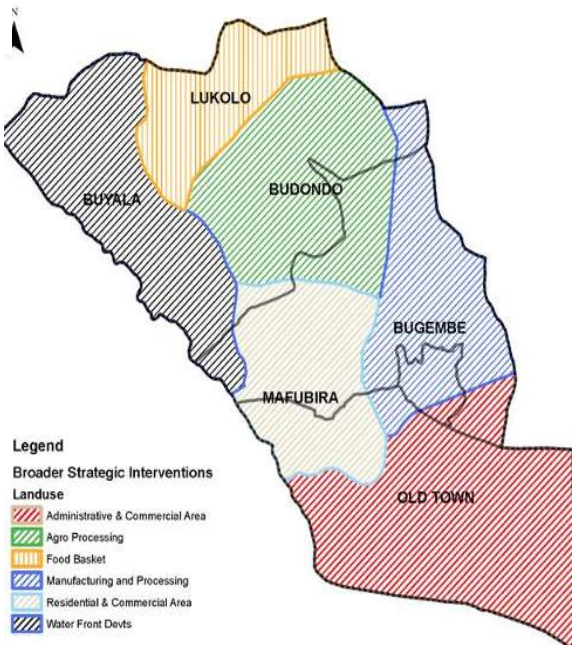
Source: WPDP

Jinja Model City Report

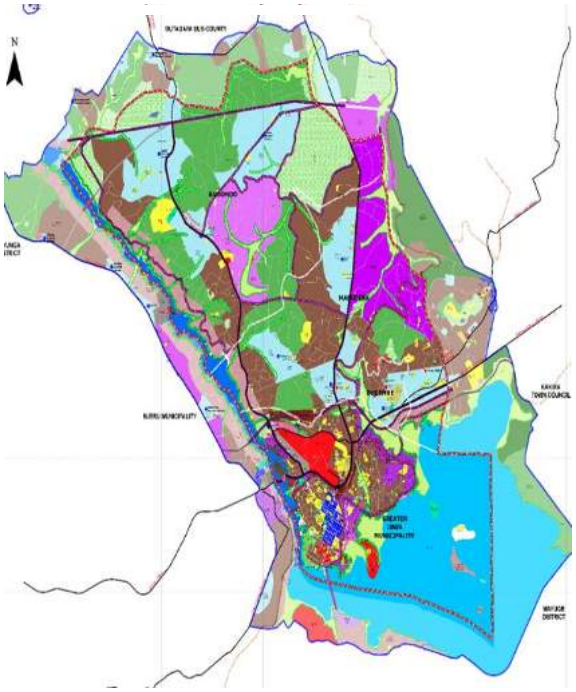
The Jinja Model City Integrated Physical Development Plan 2020-2040 supports the city's vision, which is "A sustainable and prosperous city with excellence in tourism, commerce and industry by 2040". Broad strategic interventions identify land use activities by place. For example agro-processing in Budondo, manufacturing and processing in Bugembe, food production in Lukolo, housing and commerce in Mafubira, and tourism and hospitality in Buyala.

Figure 52: Jinja Model Town Report

Map 1: Broader Strategic Interventions



Map 2: Physical Development Plan



Source: Model Town Report

3.10.3 Spatial Concept and Land use Concept

Spatial Structuring Concept

Figure 53 shows our overall spatial concept diagram for the JKM corridor. It is comprised of key spatial design elements — regions, cores, growth centres and corridors. The concept diagram is shown superimposed on the boundary of the JKM corridor. The elements in the diagram are described below.

Regions include the largely circular Kampala Metropolitan Region and Jinja Metropolitan Region as well as four trapezoidal-shaped secondary regions: the Western "Water World" and the three regions that we can call Northern, Southern and North-West regions.

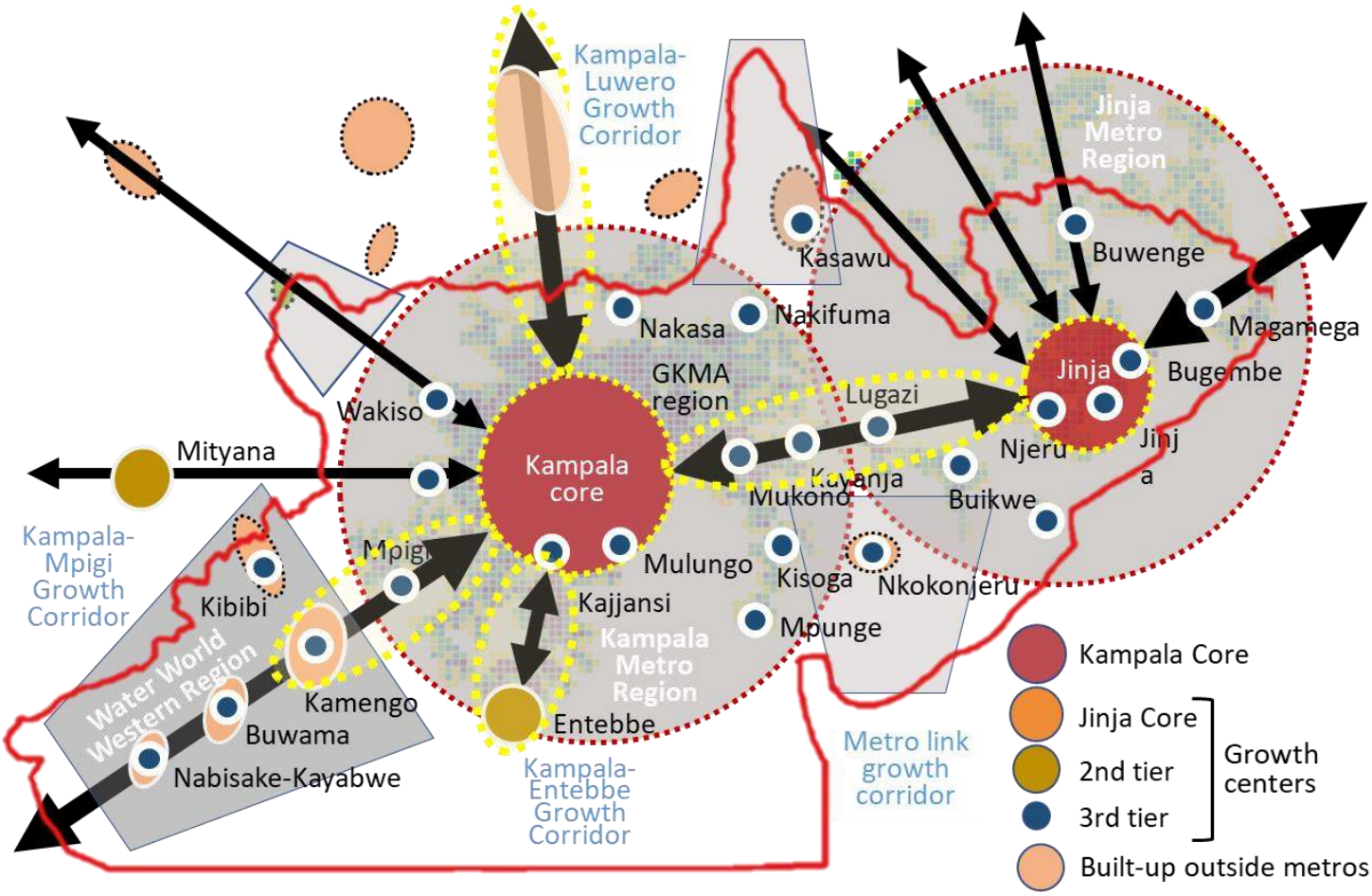
High-density urban cores are in the heart of Kampala and Jinja metropolitan regions. These cores contain high population density, tightly interconnected networks of roads and intersections, and small blocks with a high share of multistorey buildings with high footprint-to-plot ratios.

Urban centres, which may be ordered by tiers, include (i) tier-1 Kampala capital city, (ii) tier-2 municipalities of Jinja, Entebbe and Mukono; and (iii) fifteen tier-3 small towns. (Note that the tier 4 centres are intentionally not shown here). Two of the tier-2 centers are in KMR and one is in JMR. Of the tier-3 towns, 11 are within KMR, 8 in JMR, 3 in the western water world region, and one each in the north and south trapezoidal regions. The four tier-3 centres that are outside of a metropolitan area are shown within the built-up areas that surround them. The figure also shows built-up areas north of JKM and outside its boundary.

Transport corridors are aligned to the National Transport Masterplan. They are designated as either primary corridors, with thick black lines, or secondary corridors, with thin black lines. Three primary transport corridors link Mpigi-Kampala, Jinja-Kampala, Entebbe-Kampala and Luwero-Kampala. Two secondary corridors link to Kampala and three links to Jinja. The Metro-Link corridor line between Kampala and Jinja, designated here as one line, is comprised of four physical elements: the existing Kampala-Jinja Road, the new Kampala-Jinja Expressway, the existing MGR rail and the proposed SGR rail.

The concept does not show the waterways. The concept includes part of the NTMP proposed network of four- and six-lane expressways connecting the major urban and activity centres, namely Kampala-Jinja-Iganga, Kampala–Nakasongola–Masindi; Kampala–Hoima; Kampala–Fort Portal, Kampala–Masaka and (not yet shown) Nakasongola–Kamuli–Iganga.

Figure 53: Spatial Strategy Concept



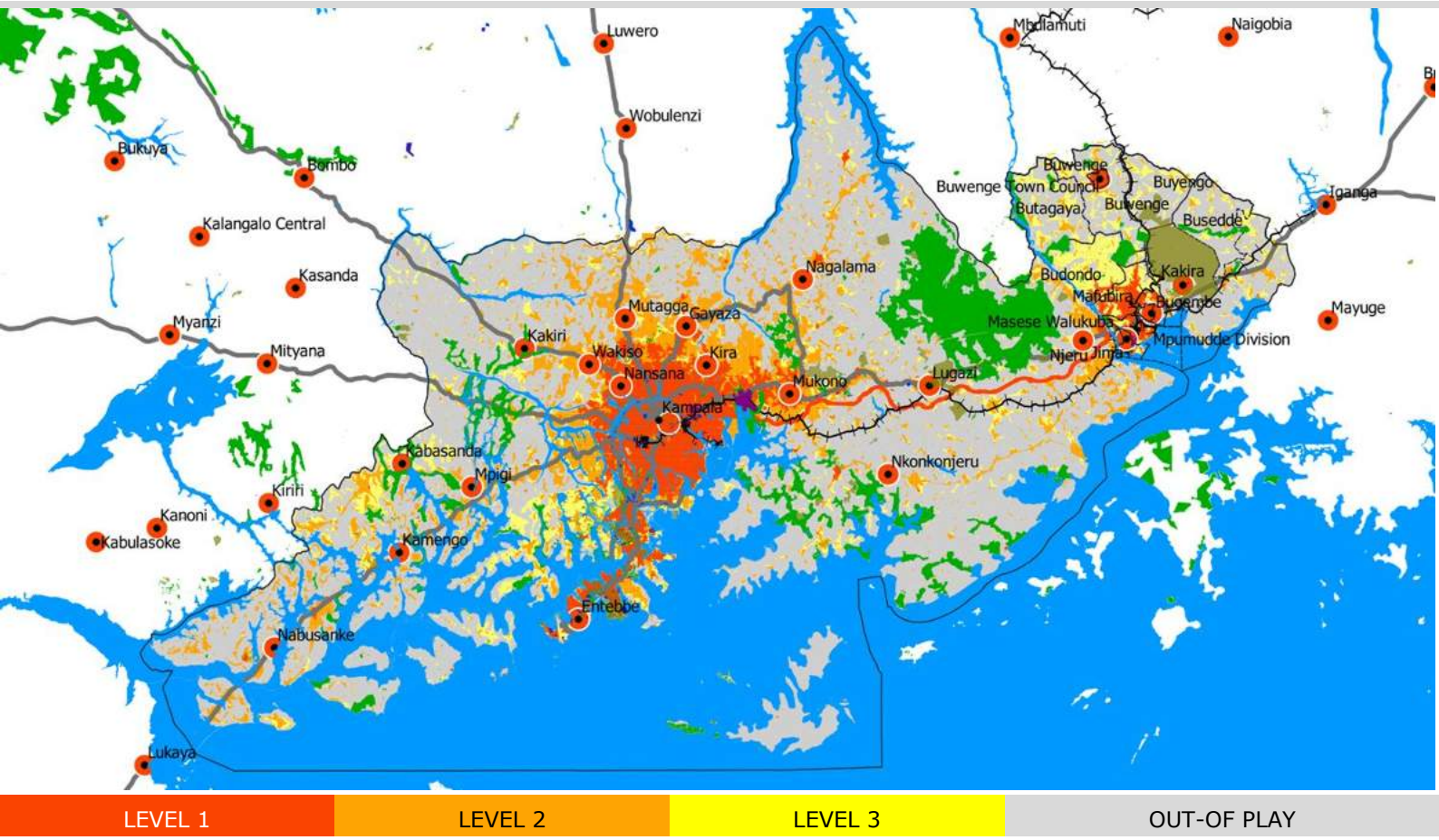
Source: COWI A/S

Land use policy concept

Our land use concept does specify the type of land use — for example, commercial, residential, industrial — but rather specifies areas by development priority level in terms of preferred development intensity and density (Figure 54*).* The concept is based on the US State of Delaware's Strategies for State Policies and Spending[47], a set of strategies that have guided all public sector investment in Delaware for over 22 years and is continually updated.

[47] Delaware has one of the best strategic growth plans in the USA, arguably a consequence of the support of now President Joe Biden, who as Senator represented the state for decades. The Delaware example is also relevant to JKM because, like JKM, it is on a major North-South linear corridor that runs along a coastal shoreline. The Delaware map was developed using spatial data analysis that balanced policies that favour growth for different areas with policies that favour land preservation, agriculture and agricultural industry development, and natural resource management. Geospatial data on land use were collected, standardised and combined. Data values were classified into logical groups to form a set of four levels that were then smoothed.

Figure 54: Land use concept



Source: COWI A/S

The concept divides the JKM territory into three levels of priority for investment and development and a level where land is classified as out-of-play for development. Levels 1-3 are designated to support physical growth, investment and economic development — in descending priority order. Out-of-play is rural in nature and is where most of JKMs open space, natural areas and agricultural areas are located; these areas contain agribusiness activities, farm complexes, and small settlements.

These levels help to shape the growth of the urban region through the targeting of public investment in infrastructures such as roads, water supply, sewers and other public facilities. They signal the government's intentions to the private sector which can then factor this information into its own investment decisions. The levels are not intended to restrict landowners' rights to use or develop their lands.

Level 1 areas are the centres of cities, municipalities, and towns, generally with higher density than their surrounding areas. In these areas, government policies and investments will encourage a wide range of land uses and densities, promote multi-modal mobility options, foster efficient use of existing public and private investments, and enhance community identity and integrity. These areas also have slums, blighted neighbourhoods, and informal settlements that need redevelopment, economic revitalization and expanded housing options.

Level 2 areas are the less developed but rapidly growing areas that have or are planned to get public water and wastewater services. They are usually near level 1 areas and serve as transition areas between level 1 and level 3. They have a limited variety of housing types, mostly detached single-family dwellings.

In these areas, the government will encourage multiple lands uses and densities, multi-modal mobility, efficient use of existing public and private investments, and enhance community identity and integrity. Investments will discourage single-family-dwellings and promote mixed residential-commercial-office use, open spaces and recreational facilities, and other public facilities and services.

Level 3 areas are of three types, 3a, 3b and 3c. Type 3a lands are not needed or desired to accommodate expected population growth during the plan period. Type 3b lands are those near or within levels 1 or 2 but have environmental, agricultural or infrastructure issues. Type 3c are lands (i) with leapfrog development not contiguous with existing infrastructure; (ii) with existing but disconnected development; and (iv) lacking adequate infrastructure. Level 3 is not a priority for investment owing to limited financial resources, or higher development costs. They will be developed once level 1 and 2 areas are mostly built out, or when infrastructure or facilities are logical extensions of existing systems.

Out-of-Play areas are rural and include open-space, natural areas and places for the agricultural industry. These areas may also have villages, small settlements and hamlets as well as agribusiness activities and farm complexes. But in some cases, private recreational facilities, such as campgrounds or golf courses may be considered. These areas may also include uses with specific requirements that are not appropriate for a location elsewhere, such as those with public safety impacts or impacts on or with neighbouring uses. They should not be used for urban and suburban development unrelated to agriculture and to the areas' needs. In these areas, the government should aim to retain the rural landscape, preserve open spaces and farmlands, support farmland-related industries, and establish defined edges for more concentrated development.

Some of these areas are not available for development and comprise forestlands, wetlands, parks and fish and wildlife preserves, natural habitats, and areas for improving water quality and reducing flood risk. They include publicly owned lands, private conservation lands, lands with legal and/or environmental constraints on development, and lands with permanent open-space protection.

Out-of-play areas do not preclude any changes or development; government entities, private property owners, and conservation organizations may invest in these areas for the purposes for which they were acquired and preserved. Examples could include improvements to park lands, water control structures, and poultry houses on preserved agricultural lands.

3.10.4 Strengthen two metropolitan regions

The JKM spatial strategy supports the development of two non-jurisdictional metropolitan regions that fall within the JKM Corridor: the Kampala Metropolitan Region (KMR) and the emerging Jinja Metropolitan Region (JMR). These regions presently account for the majority of JKMs urban and rural population and most of its land area.

Why develop metropolitan regions?

Widespread evidence from other countries shows that well-governed and well-connected polycentric metropolitan regions, or 'metros' — compared to fragmented and unconnected urban and rural areas, and compared to one large primary city — have higher quality-of-life, higher per capita productivity and greater competitiveness. Compared to one large primary city, metros have less traffic congestion and pollution.

Figure 55 shows the JKM with its two metropolitan regions. The coloured one-kilometre-square cells show the share built-up area – the darker the tone, the more built-up[48]. Theoretically, cells that are less than fully built-up have development potential and could accommodate growth horizontally in the gaps between built-up parcels. Even fully built-up cells may be able to absorb growth in the vertical dimension.

Prevent merging metros. The two metro areas are distinct — their built-up areas do not (yet) touch! — and are separated only by a rural area and the Mabira Central Forest Reserve. But this separateness is under threat: a linear built-up tentacle (A) presently extends[49] some 25 kilometres from Kampala into the JMR, leaving a small section that is not developed. The area between the two regions that are not developed should be protected and earmarked for green uses such as tourism and recreation.

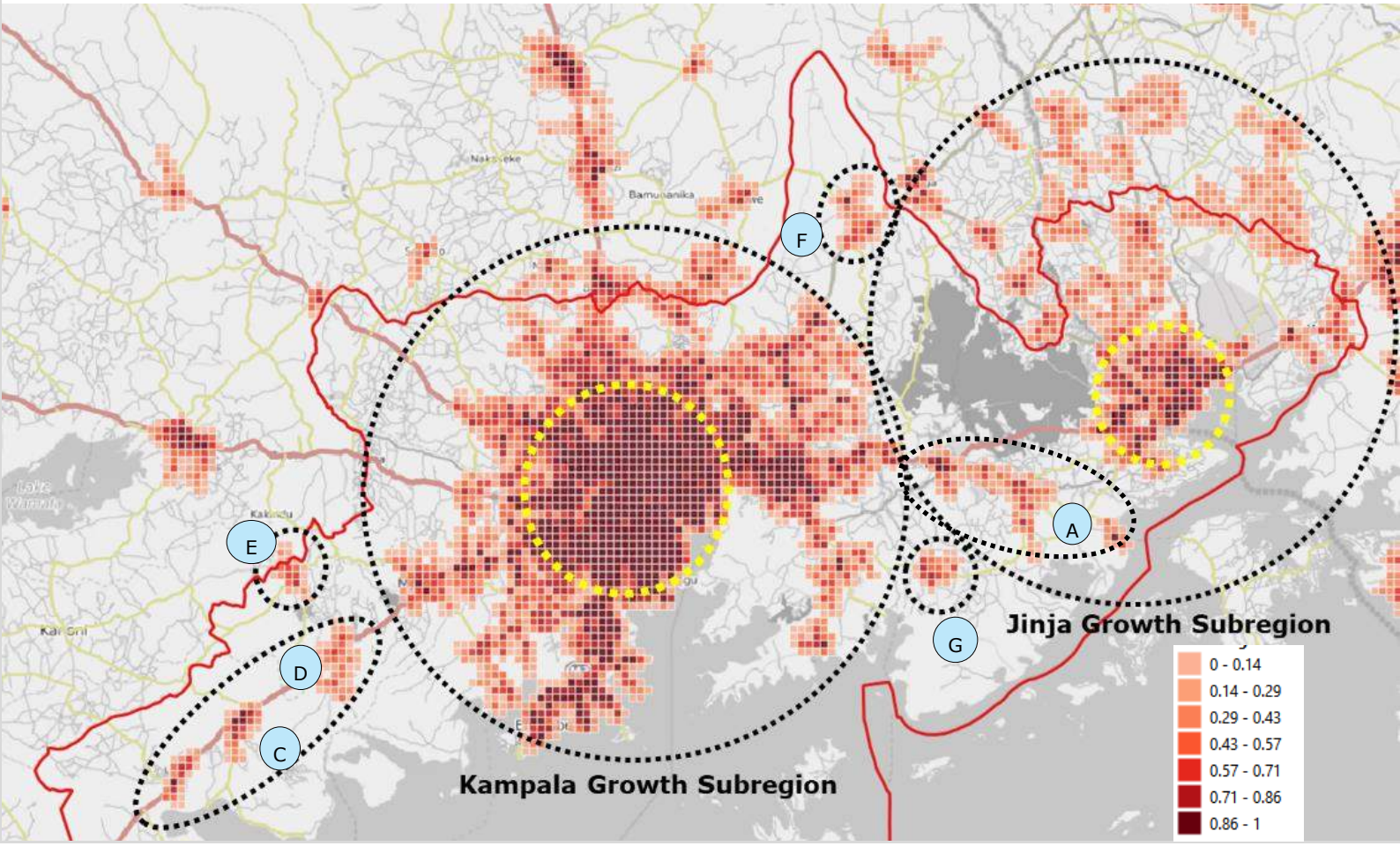
Develop the metropolitan cores. Each of the metropolitan areas has an urban core, which is a built-up area of high-density at the centre of the metro region. Built-up area density is highest (dark brown) in the 11-kilometre radius core of Kampala and the 5-km radius core of Jinja City. To the extent possible, these cores should be supported to further intensify and densify while ensuring that the level of infrastructure and services is not compromised.

Contain other built-up areas. Six areas are identified as a cluster of more than one contiguous high-density built-up cell. These include three that are roughly equally spaced along the western road: (B) Nabusanke-Kayabwe, (C) Buwama and (D) Kammengo. Two are between the KMR and JKR metro circles:(G) Nkokonjeru in the south on corridor 12 and (F) Kasawu in the north on corridor 5. One, (E) Kibibi, is not on any corridor.

[48] For example, a dark brown cell is between 86 and 100 percent built-up; a light brown cell is less than 14 percent built-up.

[49] This developed extends along the Mukono-Kyetume-Katosi-Nyenga Road from Lugazi through Buikwe, to the Kyindi Ferry port to Buvuma Island.

Figure 55: Two metropolitan regions in JKM

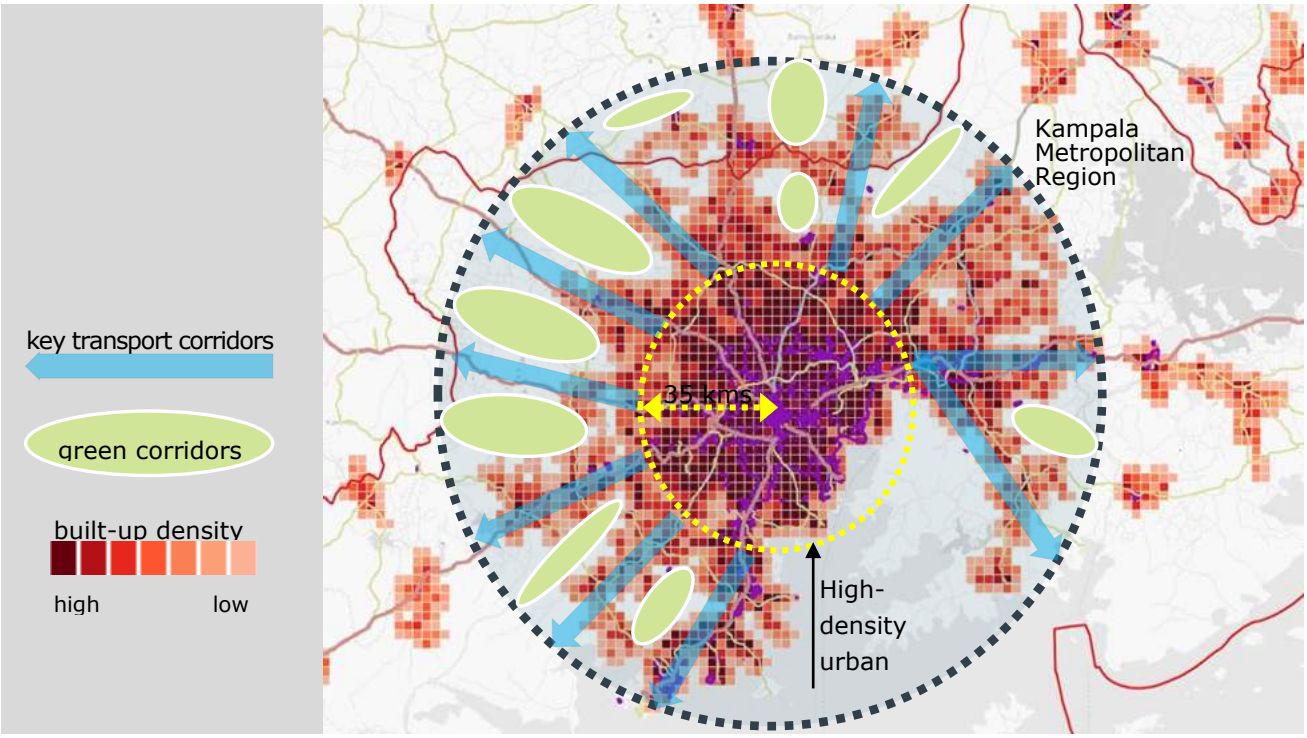


Source: COWI A/S analysis of CIESIN GRID data

Kampala Metropolitan Region

The Kampala Metropolitan Region is a contiguous built-up area, largely contained within a 35-kilometre radius that is centred at Kampala CBD. The built-up tentacles indicate that development largely follows the region's radial roads. KMR varies in density from its lower-density periphery to its high-density urban core. The space between the built-up tentacles of the KMR is still relatively undeveloped.

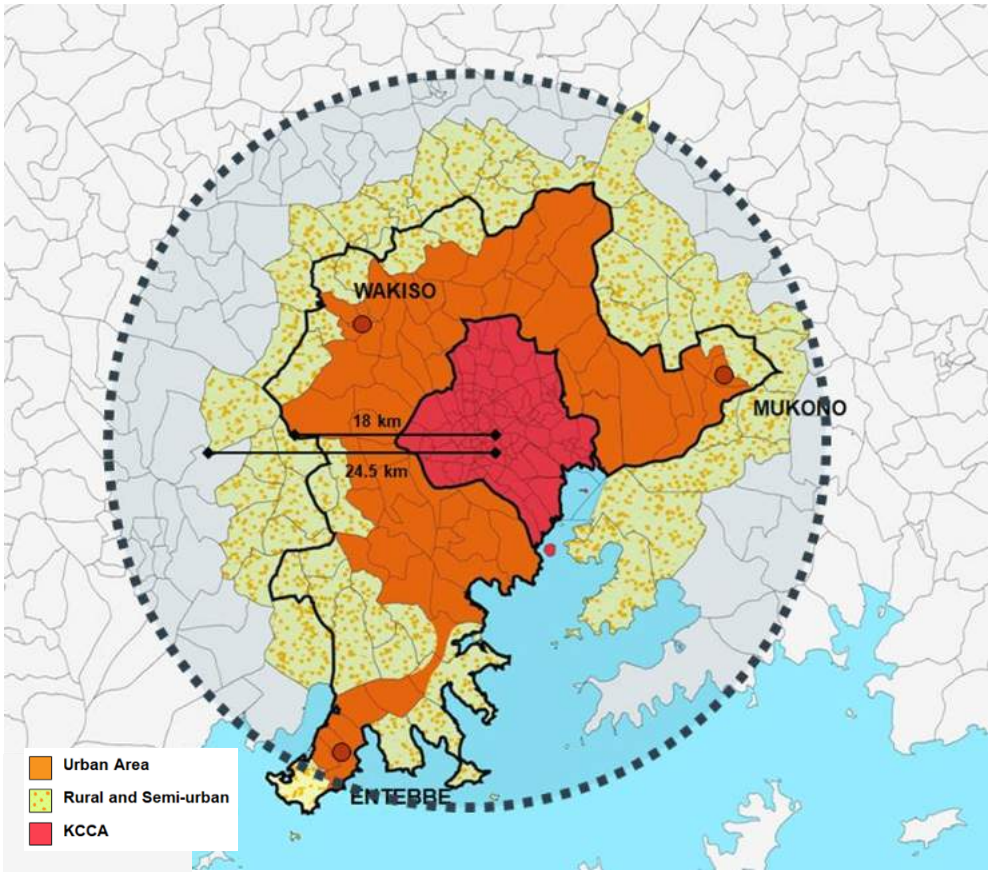
Figure 56: Kampala Metropolitan Region



Source: Bing Buildings and COWI A/S

The Kampala Metropolitan Region completely contains the current GKMA, as shown in Figure 57.

Figure 57: Kampala Metropolitan Region and GKMA



Source: COWI A/S

The spatial strategy includes the following elements to strengthen KMR:

- Develop the metropolitan core. KMRs high-density urban core, with dark brown cells, is contained in a circle within a 11-kilometre radius from the CBD. The core's high density and the large area present an opportunity for developing walkable neighbourhoods supported by a high-quality public transport system. The core is designated for level 1 priority.

- Direct level 1 growth in the core's key activity centers. The areas with key activity centres that are most receptive to absorbing growth are the Central, Rubaga, Nakawa, Bunamwaya and Makindye divisions of KCCA and within the boundaries of the Northern Bypass Road, and the water features.

- Develop the tentacles with TODs. The high-density areas also extend along these tentacles, particularly southward on the Entebbe Road and Entebbe-Kampala Expressway to Entebbe and eastward on the Jinja-Kampala Road A109 to Mukono. Development along these tentacles should be concentrated using level 1 priority and spaced along the road corridors in the form of transit-oriented-developments (TOD) that are linked to the core.

- Conserve green corridors**.** These areas between the urban tentacles remain largely rural and undeveloped but are experiencing strong development pressures. These should be conserved unless and until it is determined that the land is needed to accommodate growth, with uses earmarked for tourism and recreation.

Jinja Metropolitan Region (JMR)

The Jinja metropolitan region (JMR) — defined as the area within a roughly 35-kilometre circle radius of Jinja City — is less well-formed than KMR. Its built-up areas are fragmented and varied in density. Its green corridors are also fragmented, and bounded by built-up areas. While KMR's urban development was shaped largely by radial and circumferential roads, clear tentacles have not emerged in JMR. Another feature of JMR is the agricultural holdings north-east of Jinja city.

The spatial strategy includes the following elements to strengthen KMR:

- Support the structured growth of JMR. The JMR has great potential but lacks a dedicated plan to guide its growth.

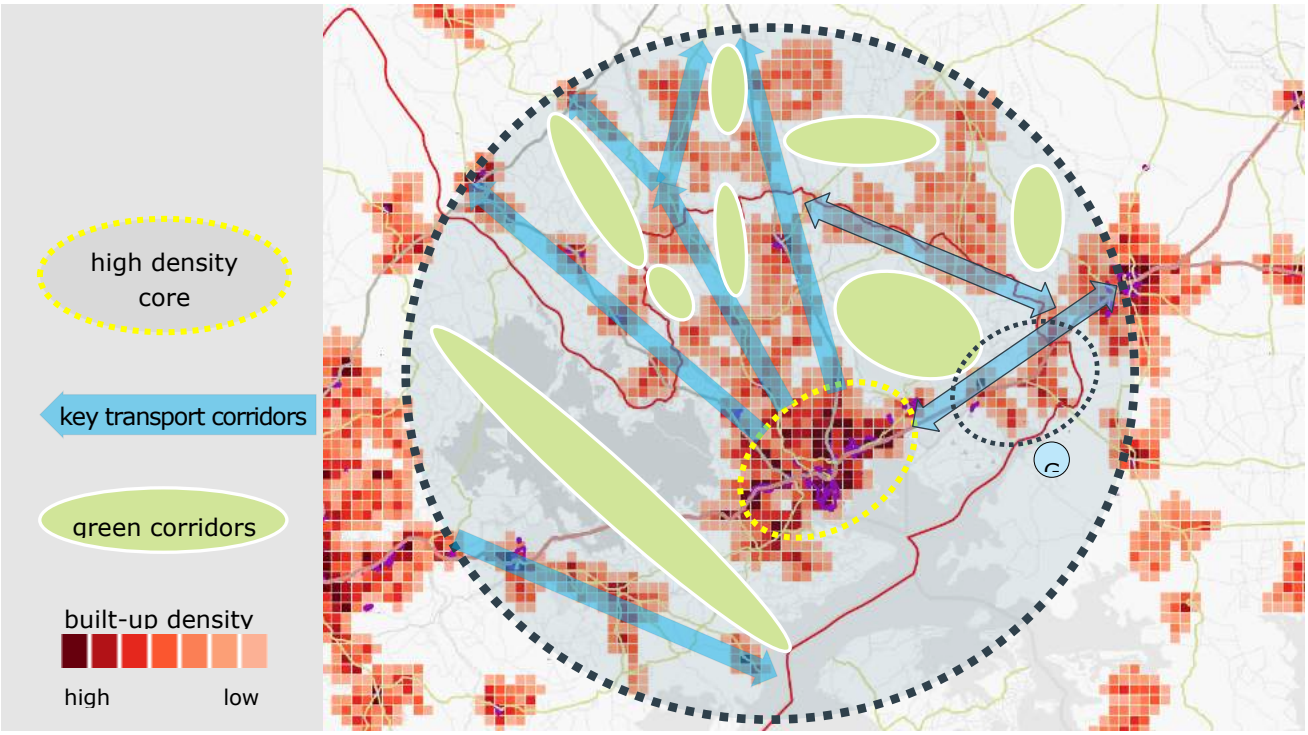
- Add Iganga to JKM. The built-up pattern of JMR is influenced by Iganga, which lies just outside the boundaries of the JKM corridor, only 35 kilometres from Jinja. The corridor between Jinja and Iganga is largely built-up with a cluster (A) between them and clusters running south of Iganga. Adding Iganga to JKM would shift the centre of gravity from Jinja to a triangular area with Jinja and Iganga as anchors and the agricultural holdings at its centre.

- Develop the metropolitan core. JMR’s high-density urban core (dark brown) extends some 5 kilometres from the CBD. The core's high density and the large area present an opportunity for developing walkable neighbourhoods supported by a high-quality public transport system.

- Direct level 1 growth within the key activity centres in the core area. This is largely identified as the cities of Jinja, Njeru and Bugembe, the latter two only 7 kilometres from Jinja.

- Conserve green corridors**.** These are areas between the tentacles of the major transport corridors. These areas between the urban tentacles remain largely rural and undeveloped but are experiencing strong development pressures. These should be conserved unless and until it is determined that the land is needed to accommodate growth, with uses earmarked for tourism and recreation.

Figure 58: Jinja Metropolitan Region



Source: Bing Buildings and COWI A/S analysis

3.10.5 Strengthen the Corridors

Key road corridors should be planned and managed to improve the flow of people and goods to avoid ribbon development and to better connect centres to each other.

Figure 59: What is Ribbon Development

Ribbon development is linked to traffic congestion, road accidents, reduced carrying capacity, the uneconomic extension of utilities, overcrowding of the frontage of the main road, and wastage of valuable land in the interior. Where ribbon development is already occurring, planners should consider creating parallel service roads, raising highways above ground level, adding green-belts, creating nodes at intersections, and acquiring and servicing land.

The principal corridor in JKM is the Northern Corridor, which we split into the metro-link corridor between Kampala and Jinja, and the Kampala-Masaka corridor. Other import corridors that have been attracting development include all the radials from Kampala, especially (j); corridor (b) between Entebbe and Kabasanda; and corridors (m), (t) and (u) that connect to the less developed subregion in the JKM's southeast. There are two parts of the main corridor, the "Metro Link Corridor and the Kampala-Masaka Corridor.

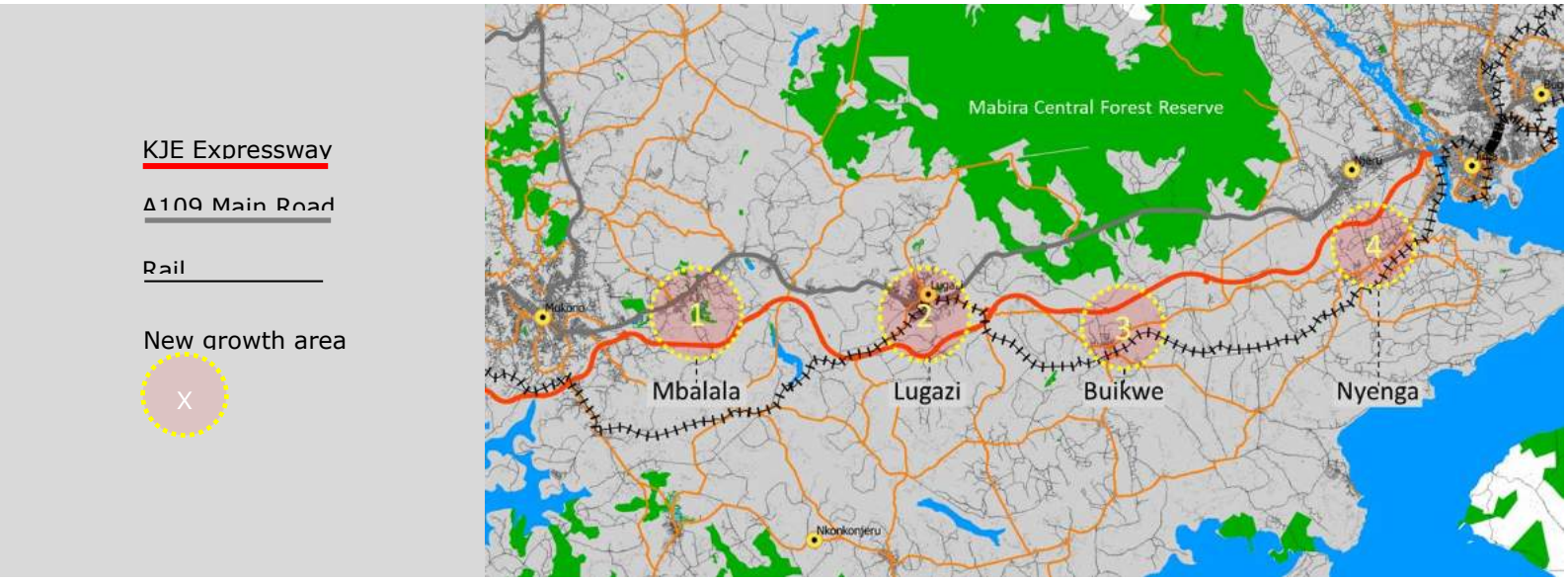
Of the two corridors, the Metro-Link has the greater potential for economic development given that the location of economic activity within the JKM Corridor has been increasing in the area, as evidenced by the change in intensity of night-time lights (see Chapter 4).

Develop the Kampala-Jinja "Metro Link Corridor"

The spatial strategy supports development in the area between the two metropolitan regions and along the Kampala-Jinja transport corridor, which we term metro-link-corridor (MLC). This area has the characteristics to support new industrial-based, residential and commercial mixed-use, multi-centred development. This area is:

- Largely undeveloped.
- Home to industries in Kesenge between Mukono and Lugazi.
- Well-served by an existing level 1 road and meter gauge railroad.
- Served by three, level 2, north-south connector roads.
- Site of the planned high-speed Kampala-Jinja Expressway.
- Site of a planned standard gage railroad.
- Easily accessible to and from the high population centers.

Figure 60: Kampala-Jinja Transport Corridor



Source: COWI A/S

The major constraint to development in this area is a large area of agricultural land and a national park. Nevertheless, these features may be considered as assets to improve the attractiveness of development in this area, the farmland providing access to locally grown fresh food and the national park providing diverse recreational opportunities.

We identify four locations for mixed urban development: Mbalala (1), Lugazi town (2), Buikwe (3) and Nyenga (4). All are partially developed but have nearby undeveloped land, and each has its strengths. Moreover, Lugazi and Buikwe are 2 of the 9 places in which the government is establishing industrial parks. The others are Mbale, Namanve, Jinja, Kapeeka'[50]

- Mbalala town, with about 45,000 people in 2020, 9 kilometres east of Mukono and 30 kilometres east of Kampala, already has an emerging industrial park. The park's 32 industries presently employ

[50] https://www.monitor.co.ug/uganda/news/national/mbalala-a-former-den-of-thieves-turns-into-mukono-s-industrial-hub-1908636

some 17,000 mostly local people. Three of the larger factories are the Tian Tang Group (mattresses, steel bars, plywood), Global Paper Limited, and C.C.L.E (motor cycle tires and tubes). Other factories make face masks, blankets and plastic shoes. Namataba, which may be part of the new development, is only a few kilometres east of Mbalala, has a central market, the Limkokwing University of Creative Technology (based in Malaysia), and the Kampala Cement Company Limited.

- Lugazi town, with about 114,000 people, is roughly centred between Kampala and Jinja, at an A109 and rail line intersection, houses a sugar factory and plantation, the recently upgraded Kawolo General Hospital, a central market, Lugazi School of Nursing, the Kasuku Tea Estate (one of Uganda's largest) Uganda), a central market and nearby agricultural land.

- Buikwe town, with some 18,500 people in 2020, growing at 1.95 percent annually between 2015 and 2020, is the administrative centre of its district. It is 67 kilometres east of Kampala and 11 kilometres south-east of Lugazi. It has a central market and an 80-bed community hospital, open in 2007, specializing in paediatrics, surgery, internal medicine, gynaecology and maternity. The town also hosts more than four places of worship.

- Nyenga town, with 55,600 people in 2020, one of the three urban divisions of the city of Njeru, is 7 kilometres south of Njeru Division. It has a Roman Catholic Church, a Mission Hospital, a 75-bed community hospital, the Saint Francis School of Nursing and Midwifery, and the Nyenga Children's Home for destitute children.

Develop Kampala-Mpigi Corridor

The spatial strategy supports development along the Kampala-Mpigi Corridor, which as part of the Northern Corridor that links to Kigali Rwanda and the Democratic Republic of the Congo.

The corridor links JKM to Uganda's Western Region, which may experience significant population growth and economic development[51]. More people may be expected to transverse the corridor between the regions for work, shopping, recreation and family visits. And more firms may be expected to truck their products and materials between the regions.

The area along the corridor has the characteristics to support the small town, compact development; tourism-, recreation- and leisure-based development; and educational institutions. This may include accommodation (small hotels, bed and breakfasts), boating and water-sports, and restaurants.

The corridor flows through a picturesque landscape of wetlands, forests and small islands. This area is largely undeveloped, easily accessible to and from the high population centres, well-served by an existing level 1 road and eventually to be served by a high-speed Kampala-Mataaka Expressway.

Located directly along the road are four small towns (Mpigi, Katende, Kamengo, Babusanke) and several large villages (Mpambire, Matal Maria, Budde, Buwama, and three others with names unknown). The

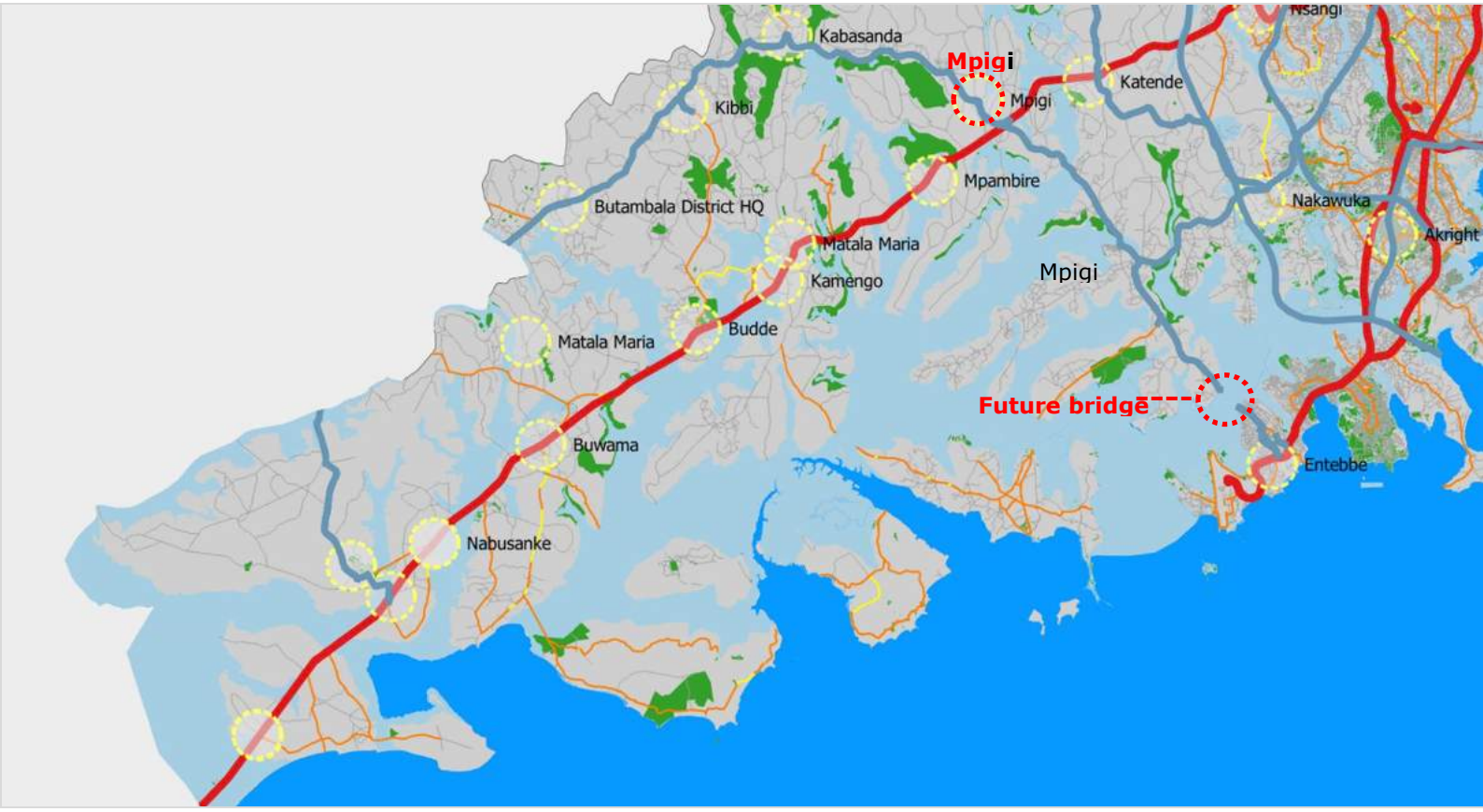
[51] According to the NPDP. Masaka, a sub-regional growth pole with a current population of 115,000, is expected to grow to beteen 0.5 to 1 million by 2040. The AGUR (agricultural/urban block) and urbanisation zone, is planned as a special economic zone with agricultural industries, biotechnologies and value added small and medium enterprises.

corridor connects to the Entebbe-Kabasanda corridor, which also connects to Kabanda town and Kibbi and Butabaka large villages.

In this corridor, we believe that Mpigi Town has the greatest potential for targeted investment and growth. With about 50,000 people, it has grown by 2.3 percent between 2015 and 2020. Its links with Kampala are strong, only 37 kilometres along a future expressway. It will have a fast and direct link to Entebbe when the bridge is built. Key assets include a central market, Chief Magistrate's Court, military and police barracks, prison, and 100-bed hospital. It is also the capital of traditional handmade drum factories.

Like in other coastal areas, new development along the coastline should be elevated at least two meters above current water levels.

Figure 61: Kampala-Mpigi Corridor



Source: COWI A/S

Develop Kampala-Entebbe Corridor

The Kampala-Entebbe Corridor is arguably JKM's most developed sub-corridor. It connects two places of national importance — Uganda's international airport and Kampala — whose growth generates a high demand for development. Yet it is spatially constrained by Lake Victoria and the wetlands, with little room to expand, leading to a relatively high density along its entire length.

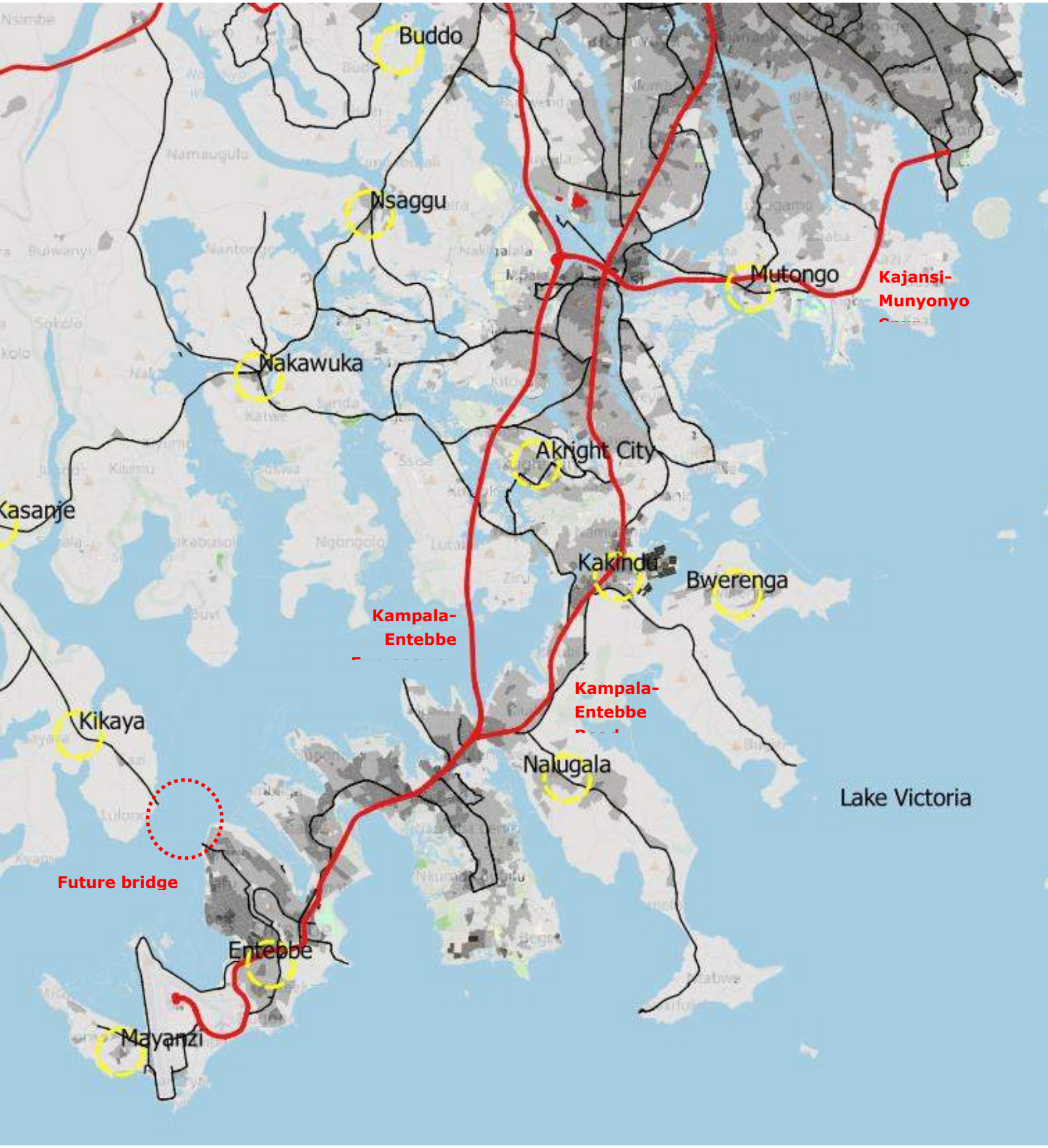
The recently completed four-lane, limited-access, 51-kilometer Entebbe–Kampala Expressway was expected to significantly reduced travel time between Entebbe and Kampala by avoiding the old Kampala–Entebbe Road, which is narrow and congested. It had been estimated the expressway would reduce travel time from Kampala to Entebbe to 30 minutes as compared to 120 minutes[52].

The best places to invest in infrastructure to support growth and development are around the intersections between the expressway and the arterial roads. These are the Entebbe airport, Kampala-Entebbe Road, Nakigalala and Busega (A109).

It is not clear how places along the old Kampala road (such as Kakindu, Namulanda, and Kajjansi) may be impacted by the new expressway, It is also not clear how the new expressway will impact mobility, who will use it, and where they will come from. Uganda started to collect road tolls in January 2022 and the impact of this on-demand has not yet been determined.

[52] A check of Google maps on 19 March 2022 at 18:00 found that the travel time between Kampala and Entrebbe on the expressway was 44 minutes versus 63 minutes on the road.

Figure 62: Kampala-Jinja Corridor



Source: COWI A/S

3.10.6 Grow the centres[53]

The Polycentric Strategy

"Grow the centres" is a short way of referring to the polycentric development strategy that JKM stakeholders selected over the other two options that they considered: continued dispersed development and concentrated development.

The polycentric strategy supports the metropolitan and corridor strategies. Overall, the strategy aims to develop existing centres to accommodate most of JKM's residential and commercial growth, and a large share of its industrial growth. In order of priority, the strategy aims to: (i) strengthen and revitalize existing centres within the two metropolitan regions; (ii) strengthen and revitalize other centres in selected corridors; (iii) create a limited number of new centres or satellites (see section 0 Develop new towns and satellites).

What are Centers? In short, they are places that provide a preferably balanced combination of housing, jobs, education, shopping, entertainment, recreation and more in a relatively small area.

Why grow the centres? Because investing in growing centres is the best way to deliver the largest number and greatest diversity of opportunities to the largest number and greatest diversity of people. By being denser than surrounding suburban and exurban areas, centres can better realize the benefits of investments in public transport and public facilities. And by the more efficient use of land, energy, infrastructure and other resources, centres also benefit the economy and the environment.

Why a polycentric region? Compared to one large city, a polycentric region has less congestion, less pollution and less competition for land and workers. Polycentric regions consume less land and infrastructure. Their housing and travel costs are lower, labor productivity is higher. Their smaller centres can “borrow” size from their neighbours, compared to a self-standing city of similar size.

The polycentric strategy is supported by the National Physical Development Plan. NPSD calls for "a polycentric settlement system to "limit the expansion of the Greater Kampala Metropolitan Area in favour of planned urbanization along the corridors", maximise the use of resources, improve education and health care, enhance economic activity in the periphery, and allow GKMA to grow in an orderly and more sustainable way". Polycentrism is also supported by planners and researchers the world over, in Europe, USA, China, Japan and Australia and by planning bodies such as the European Spatial Planning Observatory (ESPON), American Planning Association (APA), Royal Town Planning Institute (RTPI) and the Australian Planning Institute.

The spatial strategy calls for a hierarchy of centres of different roles, sizes, functions and characters. These include a capital city, regional cities, sub-regional cities, major towns and townships. Within JKM, these centers include Kampala City, Jinja City, a major town (Entebbe), a minor town (Mpigi), two new satellite towns, suburban centres, and neighbourhood activity centers.

The centres will vary in their roles based on the number of jobs in their market-shed, as well as by existing density and public transport service characteristics. Larger centres may have pedestrian- and public-transport-friendly areas with a mix of high-density residential and commercial land use and a

[53] "Grow the centers" essentially is the polycentric strategy that was approved by stakeholders.

distinct downtown or main street. Smaller centres may reflect existing job concentrations and a mix of office, retail and services, but lack pedestrian-scale characteristics.

How To Grow The Centers

Once we agree on a strategy for growing centres, we are faced with the question of how best to do it. Best practice dictates that there are at least four approaches: (i) increasing the centre's total floor area; (ii) improving the way it functions; (iii) supporting commercial activities; and (iv) linking the centres together.

Increase floor space

The floor area can be increased though a combination of actions such as building higher, filling the gaps, and redeveloping plots.

- Build higher. This strategy applies to existing and new buildings on existing and new plots. Adding more floors to existing buildings increases its floor space but may require additional measures such as strengthening footings and structure and adding stairways and lifts.

- Cover plots with more buildings. On-grade additions and new free-standing buildings will increase the floor area of a plot. Several USA cities are revising their zoning codes to permit up to three dwelling units on plots formerly zoned for single-family houses

- Fill the gaps. Vacant plots or vacant areas can be developed with plot densities that are at least but preferably higher than those in the surrounding neighbourhood.

- Redevelop existing buildings. Existing buildings, particularly those that are outdated or derelict, may be demolished and the site rebuilt with higher floor-area-ratios and plot-densities. This strategy may be used for residential, commercial or mixed-use properties.

Improve performance

A strategy to increase a centre's population must be accompanied by measures that improve its performance, such as by encouraging mixed uses, including those that provide employment, multiple dwelling types, public transport and active mobility. Studies show that centres work best when they are not only dense but also diverse and accessible.

- Encourage mixed uses. Polycentric centres must aim for mixed-uses — residential, commercial, office, schools, health facilities, and light industrial — preferably within walking distance of each other, which will reduce driving distances and congestion, and improve air quality. While centres may favour one or more uses, they will be more vibrant and livable with a mix of uses.

- Encourage multiple dwelling types. Polycentric centers must aim for a wide range of residential building types, prices and tenure types — from single-family to 3-4 storey multi-unit walkups, and even multi-storey elevatored towers, where appropriate, and based on the type of centre. Larger and denser centres will have more multi-storey units

- Link centres with good public transport. To thrive, the centre must be linked by an efficient public transport system that connects directly to other centres.

- Encourage a high job-per-population ratio. A recent study[54] found that they should have high activity density, a high ratio of (0.2 to 0.5) of jobs per population; high density (150 to 300) of intersections per square mile; high regional job access within 30 minutes by transit.

Centers and Transport

Promote public transport

Improved public transport (PT) supports the growth and vitality of centres. It benefits urban centers and public transport riders. Typically, when centres are served by good public transport, they experience increased property values, which can be taxed; higher local shop revenue, because riders pass shops and spend more than car users; decrease demand for parking; fewer accidents, injuries and deaths; and less road congestion, noise and fumes.

Public transport also benefits its riders. They enjoy a healthier lifestyle; an opportunity to read, write, and relax during trips; and, forgoing car ownership, savings to spending on other things. And for the carless, children, seniors and disabled, enjoy independent mobility that they would not otherwise have.

Nevertheless, the public transportation system in JKM remains inadequate[55]. Existing bus services, Pioneer Easy (stage) Bus and the Ewakula Ennume bus, cover few routes and provide rudimentary service. Pioneer Easy covers four routes to Namugongo, Bweyogerere, Luzira and Kajjansi but follows no schedule and has designated bus stops or terminals. Ewakula Ennume bus covers three routes and serves Gayaza, Kasangati, Mpererwe, Kawempe, Maganjo, Namugoona, Matugga and Nabweru.

Two new bus service providers are planning to enter the market. Tondeka Metro Bus will serve seven routes to Mukono, Nsangi, Wakiso town, Matugga, Entebbe, Ggaba and Buloba Kiweesa. KCCA is planning new bus services covering the CBD on two critical routes[56]. It also planning a Bus Rapid Transit (BRT) system for the GKMA core, which include nine BRT corridors (Masaka road, Bombo road, Hoima road, Entebbe road, Ggaba road, Jinja road, Port Bell road, Kira road and Gayaza road.

[54] Guidelines for a Polycentric Region to Reduce Vehicle Use and Increase Walking and Transit Use; 2020; https://doi.org/10.1080/01944363.2019.1692690

[55] State-owned bus companies collapsed in the late 1990s, leaving informal transport operators such as minibuses and motorcycle Boda Bodas to dominate the sector.

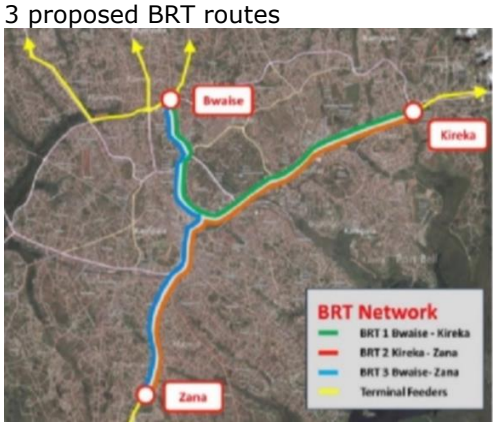
[56] Route 1 covers areas such as: city square, Centenary Park, Lugogo cricket ground, Kololo high secondary school, Kira road police station, Kamwokya market, Mulago hospital, Wandegeya and Watoto Church. Route 2 covers areas such as City square, Watoto Church, Wandegeya, Mulago Hospital, Kamwokya Market, Ntinda, Spear Motors and Nakawa Market.

Figure 63: Public transport services

Pioneer bus routes

Ewakula Ennume bus routes

3 proposed BRT routes



Source: COWI A/S

The following initiatives a proposed to improve public transport in a way that also supports centres.

- Establish a dedicated agency for urban transport and identify officials to be recruited and send them for further training. Develop government agency awareness, skills and understanding of urban transport, management and planning of cities.

- Invest in public transport support facilities in key JKM towns (not just Kampala) such as bus stops, bus terminals and railway stations, establish efficient and well-integrated transport systems and improve the quality of services provided.

- Expand public transport service to areas that have achieved, or plan to achieve, public transport-supportive densities.

- Facilitate improved linkages between and within municipalities from nearby neighbourhoods to urban growth centers, transit station areas, and other strategic growth areas.

- Work with existing public transport service providers to support PT service integration within and across municipal boundaries. Support existing bus service providers to expand their service areas and improve level-of-service.

- Prioritise public transport in areas with existing or planned higher residential or employment densities to optimize return on investment and the efficiency and viability of existing and planned service levels.

Promote active transport

Improved active transport — walking and cycling, but also called non-motorized transport — also benefits the centres and the walkers. Benefits include: faster travel, more comfort, improved traffic safety, increased mobility, reduced energy consumed, less land consumed, and more accessible amenities. Potential benefits linked to reduced use of cars are reduced GHG and other emissions, reduced noise pollution, reduced mobility costs, lower congestion and faster travel time, more social interaction, and more attractive public spaces.

With these potential benefits, it is no surprise that active transport planning is now an essential part of urban planning the world over, including in Uganda[57]. A recent survey of Ugandan towns, including three in the JKM corridor, revealed that walking already constitutes over half of all trips in these towns., with only 20 percent by boda boda, 11 percent by minibus taxis, and less than 10 percent in private cars.

If active transport were actively supported, a higher share would walk, walk further, and walk safely. Therefore, the strategy includes the following policies:

- Plan for active transportation networks that are comprehensive and integrated with other modes to provide safe, comfortable movement by pedestrians and bicyclists, continuous links between strategic growth areas, adjacent neighbourhoods, major trip generators, and transit stations.

- For walkers - plan for wide pavements, paths and dedicated road crossings, green elements and plentiful seating to increase convenience and comfort.

- For cyclists - plan for dedicated cycle paths, separated from motorized traffic. Ensure good connectivity and coverage of bike path networks and provide end-of-trip facilities such as adequate and secure bike parking, and shower and locker facilities at workplaces.

- Build on existing NMT investment in Kampala and use this as a role model city for NMT planning[58] and evaluate and expand the pedestrian projects in Jinja and Entebbe.

- Reduce the dominance of the car, for example by introducing car-free zones and softer measures that make car use less attractive. Measures include limited car parking, traffic calming and lower speed limits.

3.10.7 Cluster the centers

A polycentric strategy provides an opportunity for synergy, where the whole of all centres is greater than the sum of individual centres. The opportunity for synergy also applies to clusters of centres that are near to each other or can be brought closer through investments in improved transport. Centres that are close

[57] Uganda's NMT policy, dating from 2012, promotes NMT in infrastructure planning, provision, regulation and enforcement. But so far very few roads are NMT-sensitive and most lack safe pedestrian walkways, crossings and footbridges.

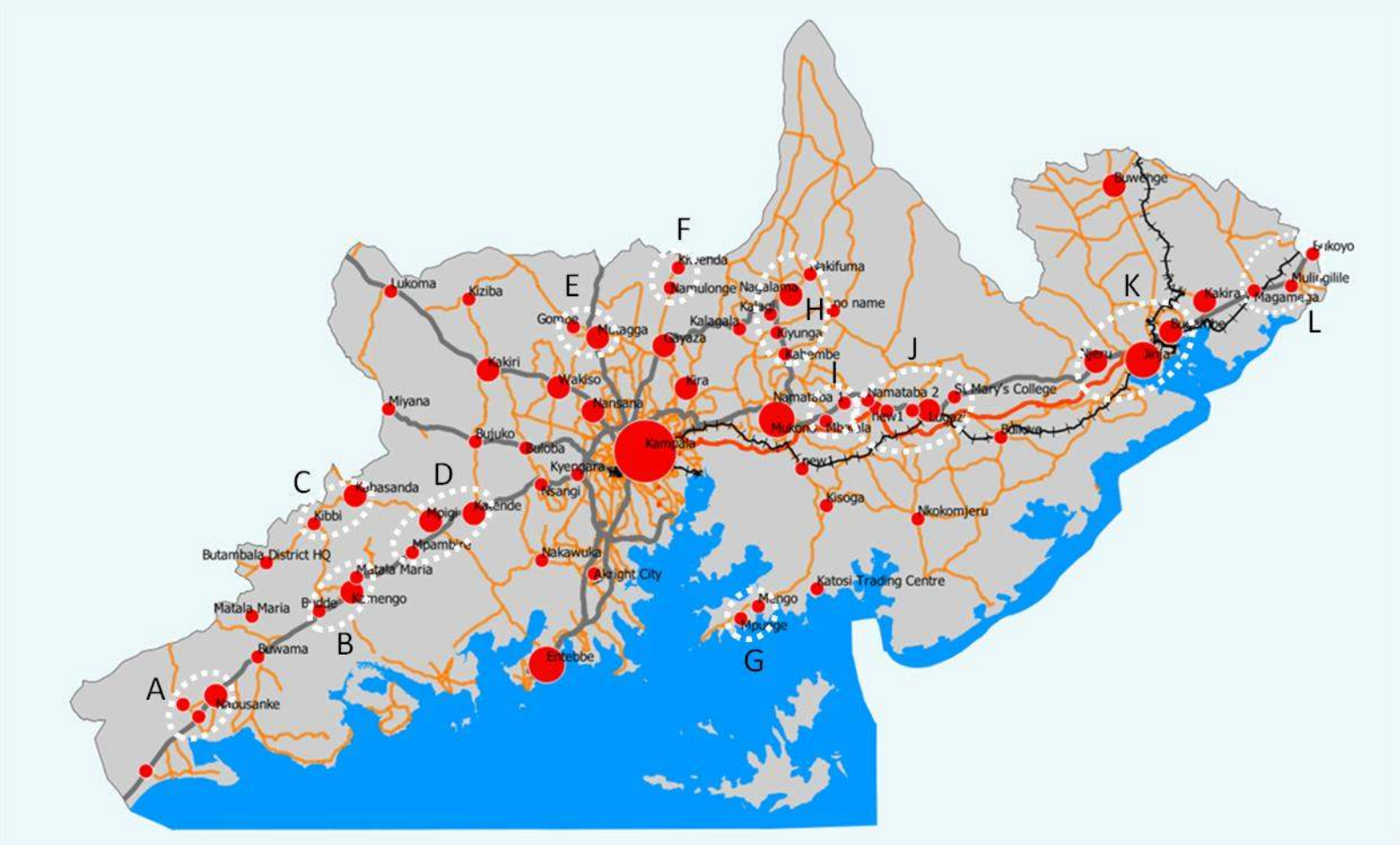
[58] Kampala has built about 2 kilometers of pedestrian walkways, rehabilitated or building several kilometers of pedestrian walkways with World Bank and African Development Bank funding.

can share public facilities and services, engage easily in trade, and pool their populations to attract high-level services and investment that they could not do alone. Centres can collaborate over matters of mutual interest, jointly plan and develop infrastructure, and enhance their social capital. Potential benefits of centre-to-centre cooperation and integration are:

- Greater economies of scale, such as a larger labour market and job market, greater access to wider business and knowledge networks, and more political power to lobby the government and compete for resources.
- Greater economies of scope, where firms have complementary strengths and assets, for example, in the form of research, technology and economic bases.
- Greater social capital leading to more partnerships between firms and people.
- Shared facilities, reducing financial costs and risks for places involved, and allowing access to a greater variety of facilities.

Figure 65 identifies twelve potential clusters of multiple centres, based on their proximity. For example, cluster J, strung 18 kilometres along A109, includes six large villages (Namataba 2, Namagunga, Kitenga, St Mary's College, and one without a name) and Lugazi town.

Figure 64: Map of Potential Clusters of Centers



Source: COWI A/S

Figure 65 provides a list of the potential clusters that are shown on the map, with the largest centre in the cluster indicated in red. Some clusters have only two centres while others have up to five. Where the cluster has centres of different tiers, the largest centre may be designated as the cluster coordinator.

Figure 65: Potential clusters of centers

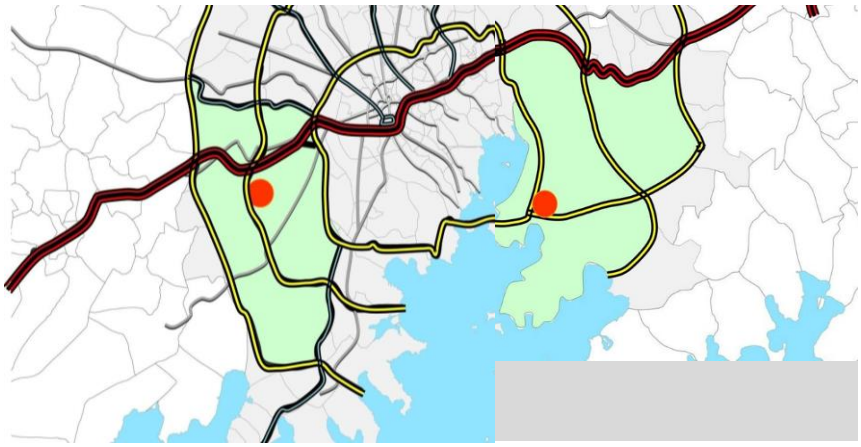
A	Nabusanke and two unnamed small towns.
B	Kamengo, Matala Maria, Budde
C	Kabasanda and Kibbi
D	Katende, Mpambire and Mpigi
E	Gombe and Mutagga
F	Kiwenda and Namulonge
G	Mengo and Mpunge
H	Kabembe, Kalagi, Kiyunga, Nagalama, Nakifuma
I	Mbalala and Namataba 1
J	Lugazi, Namataba 2, St Mary's College and two unnamed large villages
K	Jinja, Njeru and Bugembe
L	Bukoyo, Magamega and Mulingilile

3.10.8 Develop new towns and satellite cities

The strategy of developing new towns and satellites is already part of NDPD. NPDP calls for five new towns and two satellite towns in GKMA. Satellite towns are expected to grow to 250,000 by 2040. These satellites aim to decongest central Kampala and provide quality housing, employment and entertainment nodes. The first two highest priority satellite cities are planned at Nakigalala (a site straddling Sisa and Nsangi Sub-counties in Wakiso District) and Nakisunga–Ntenjeru (currently in Mpatta sub-county) in Mukono District. Site 1, Nakigalala, is near an interchange on the Entebbe Expressway about halfway between Kampala and the international airport, on the spar to Munyonyo, which will eventually connect to the proposed Jinja Expressway – huge potential for Transit Oriented Development.

Figure 66: Maps of Proposed Satellite Towns

Map 1: Ssisa and Nsangi Map 2: Nakisunga and Ntenjeru



Source: KPDP Final Report 2013