

Ministry of Local Government, Decentralization, and Rural Development – Greater Accra Metropolitan Area / January 2022

GUMAP – Short term technical assistance for the completion of databases and maps of public transport routes and passenger flows in GAMA

Activity 003

Final Report



File name	Version	Date	Changes	Project Director	Project Manager	Contributors
0844_202-003-rep-1-ssd-trotro_mapping_final_report.docx	1	22.11.2021	-	P. Martin	S. Saddier	H. Mahfouz A. Melegy M. Hegazy E. Ball
0844_202-003-rep-2-ssd-trotro_mapping_final_report.docx	2	21.01.2022	Addressing comments received on 4 Jan 2022	P. Martin	S. Saddier	H. Mahfouz A. Melegy M. Hegazy E. Ball

Contact: Simon Saddier
simon.saddier@transitec.net
Transitec Consulting Engineers
av. A.-Tissot 4 · CH-1006 Lausanne SWITZERLAND
T +41 (0)21 652 55 55 · F +41 (0)21 652 32 22
international@transitec.net · www.transitec.net





Table of Contents

1. INTRODUCTION	7
2. BACKGROUND AND OBJECTIVES	7
3. ORGANIZATION THE FIELD RESEARCH CAMPAIGN	8
3.1 SCOPE OF WORK	8
3.1.1 DIRECT AND INDIRECT BENEFICIARIES	8
3.2 TEAM STRUCTURE	9
3.3 FIELD RESEARCH TARGETS	11
3.4 FIELD RESEARCH PERFORMANCE AND CHALLENGES	12
3.5 LESSONS LEARNED AND RECOMMENDATIONS	13
4. DATA ANALYSIS	14
4.1 TRANSPORT SUPPLY	14
4.1.1 MODE CHARACTERISTICS	15
4.1.2 ROUTE LENGTH	15
4.1.3 HEADWAY	16
4.1.4 SPATIAL DISTRIBUTION OF PUBLIC TRANSPORT SERVICES	18
4.2 TRANSPORT DEMAND	18
4.2.1 STOPPING PATTERNS	18
4.2.1 BOARDING AND ALIGHTING PATTERNS	20
4.2.2 RIDERSHIP OF PUBLIC TRANSPORT SERVICES	22
4.3 NETWORK PERFORMANCE	23
4.3.1 TRAVEL SPEEDS	23
4.3.2 FARES	25
4.3.3 ACCESSIBILITY ANALYSIS	26
5. DATA SUSTAINABILITY STRATEGY	29
5.1 PROCESSES	29
5.1.1 DATA UPDATE & MAINTENANCE	30
5.2 SOFTWARE	30
5.2.1 CONCEPT	30
5.2.2 DESIGN	31
5.3 IMPLEMENTATION STRATEGY	31
5.3.1 POLITICAL WILL	32
5.3.2 PROVISION OF RESOURCES	32
5.3.3 DISSEMINATION	32
5.3.4 PROJECT MANAGEMENT	32
5.3.5 INNOVATION	32
5.4 RECOMMENDATIONS	33
5.4.1 DATA STORAGE	33
5.4.2 PRESENTING THE WORK	33
5.4.3 CONTINUATION OF DATA COLLECTION	33





6. CAPACITY BUILDING WORKSHOPS.....	35
6.1 WORKSHOP 1: FIELD RESEARCH STRATEGY	35
6.2 WORKSHOP 2: FIELD RESEARCH MOBILISATION.....	35
6.3 WORKSHOP 3: DATA PROCESSING AND MANAGEMENT.....	36
7. REFERENCES	37





List of Figures

Figure 1 - Direct and indirect beneficiaries of activity 003	8
Figure 2 - Direct Beneficiaries	9
Figure 3 - Field Research Organization	10
Figure 4 - Routes mapped throughout field research	14
Figure 5 - Routes used in analysis, broken down by mode	15
Figure 6 - Route length distribution – Trotro	16
Figure 7 - Headway distribution for all trotro routes	17
Figure 8 - Headway (dots) and fitted headway (line) of three select trotro routes throughout the day	17
Figure 9 - Stop distribution by mode	19
Figure 10 - Stop density distribution by mode	19
Figure 11 – Recorded boarding patterns during the morning peak period	20
Figure 12 – Recorded alighting patterns during the morning peak period	21
Figure 13 - Travel speed distribution by mode	23
Figure 14 – Average commercial speed by road segment	24
Figure 15 - Single trip fare vs trip length	25
Figure 16 - Single trip fare vs trip duration	26
Figure 17 - Process for a standard data collection project	29
Figure 18 - Software and hardware components	31

List of Tables

Table 1 - Onboard survey targets (per direction)	11
Table 2 - Frequency survey targets	12
Table 3 - Mode operational characteristics	15

List of Maps

Map 1 - Public transport vehicles per hour on recorded routes - Morning peak period	18
Map 2 - Passenger flow (Morning peak period)	22
Map 3 - Point-based Accessibility – Madina Station (Zongo Junction)	27
Map 4 - Point-based Accessibility – Circle Station	27
Map 5 - Point-based Accessibility – Accra New Tema Station	28
Map 6 - Point-based Accessibility – Community 1 (Tema Casino)	28



Appendices

Page

Appendix A – Terminals without Identification Surveys.....	38
Appendix B – Summary of collected data by MMA.....	40





1. Introduction

- This document is **the Final Report for Activity 003** under the Ghana Urban Mobility and Accessibility Project (GUMAP), implemented by the Ministry of Local Government, Decentralization, and Rural Development (MLGDRD) and financed by the Swiss Confederation. MLGDRD appointed Transitec Consulting Engineers in April 2020 to deliver a range of consultancy services (“activities”) towards the implementation of GUMAP as part of a framework contract.
- Activity n°003 is a **short-term technical assistance for the completion of databases and maps of public transport routes** and passenger flows in the Greater Accra Metropolitan Area (GAMA). Transitec has formed a consortium with Transport for Cairo (TfC) – an Egyptian consultancy specialized in transport data and analytics – to deliver this technical assistance. The consortium submitted its technical and financial proposal in October 2020. The proposal was subsequently amended following negotiations with MLGDRD and approved on the 2nd of March 2021. The team mobilized immediately and carried out its first field mission in Accra from the 22nd to the 26th of March. The first inception report was submitted on the 26th of April 2021 and subsequently amended with additional information regarding the process followed to select routes to be surveyed. The core of this assignment consisted in a two-month data collection campaign in the metropolitan and municipal assemblies (MMDAs – although no district was technically covered by this assignment) of GAMA. Field research was organized jointly with the staff of the MMDAs, and coordination and support were provided by MLGDRD, GAPTE, and the Department of Transport (DoT) of AMA. Data collection was carried out from the end of May to early August 2021, mobilizing a local research team composed of 20 field researchers, two local coordinators, and a GIS specialist.
- The present report **presents the results of the data collection campaign** at the center of this activity.

2. Background and objectives

As indicated in the terms of reference (ToRs) of this activity, one of the major issues in urban mobility in GAMA is the **unsatisfactory performance of public transport**, which is essentially provided by minibuses (trotros) and shared taxis under a relatively strong informal regulatory system. Although some progress was achieved under the Ghana Urban Transport Project (GUTP) in registering public transport vehicles, mapping trotro routes, and assessing trotro operations performance, the surveys that were carried out at the time focused on the administrative boundaries of Accra Metropolitan Assembly at the time. As a result, little is known about the operational characteristics of trotro routes in GAMA. In addition, metropolitan and municipal assemblies outside of AMA have **limited experience and capacity in the field of data collection and mapping**. In the absence of baseline data describing the services operating under their jurisdiction, it is difficult for the DoTs of these assemblies to effectively plan and regulate trotro operations. The main goal of this activity was therefore to collect data and map trotro routes in GAMA. The specific objectives of this assignment are detailed as follows in the ToRs:

- **to define a streamlined methodology** for data collection and update;
- **to build the capacity** of participating DoTs in data collection and processing methods; and
- **to produce datasets** describing the spatial and operational characteristics of trotro routes in GAMA.

The consortium pursued these objectives while trying to achieve the following high-level outcomes:

- the consolidation of a sound and simple **data collection framework** for the DoTs, including survey methods and protocols on how to use the required survey and processing tools;
- **the transfer of knowledge and skills** towards the staff of beneficiary assemblies in order to empower DoTs to carry out data collection, analysis, and monitoring missions autonomously in the future; and
- **the establishment of a consolidated database** covering a sample of trotro routes across GAMA and including metrics on the spatial characteristics and performance of these routes.



3. Organization the Field Research Campaign

Field research was carried out between 31st of May and 9th of August 2021. During that phase, the team collected data on 192 unique route legs. This section gives an overview of the field research organization, the types of data collected, and the challenges met during the data collection campaign.

3.1 Scope of Work

Data collection was carried by field researchers (FRs) equipped with smartphones installed with the RouteObserver app developed by TfC. Recorded data was transferred in near real time to TfC’s servers using the 4G network. The data collection campaign included two types of surveys:

- **Onboard surveys** were used to capture data about trotro routes by recording actual trips taken on those routes. The field researcher boards a departing vehicle and records various attributes of his or her trip using the RouteObserver app, including:
 - Trip distance, duration, and speed (which can be disaggregated by segment of the trip)
 - Trip itinerary (this is collected automatically through GPS tracking)
 - Terminal and stops location and name
 - Number of passengers boarding and alighting at each stop
- **Frequency surveys** were carried out at terminals. The field researcher monitors vehicles departing on specific routes and records the time of departure of each vehicle by pressing a button on the app. This is used to calculate headway and estimate supply and demand¹ on each route.

A total of 440 field researcher-days were initially budgeted to carry out the field research (40 for training and 400 for data collection), but this proved insufficient to meet the assignment’s targets and the level of effort had to be adjusted upward.

Workshops were carried throughout the project to explain the entire workflow and the necessary information to replicate the data collection campaign. Beneficiaries were also invited to observe and be involved in the data collection activity first-hand in order to maximize knowledge transfer.

3.1.1 Direct and Indirect Beneficiaries

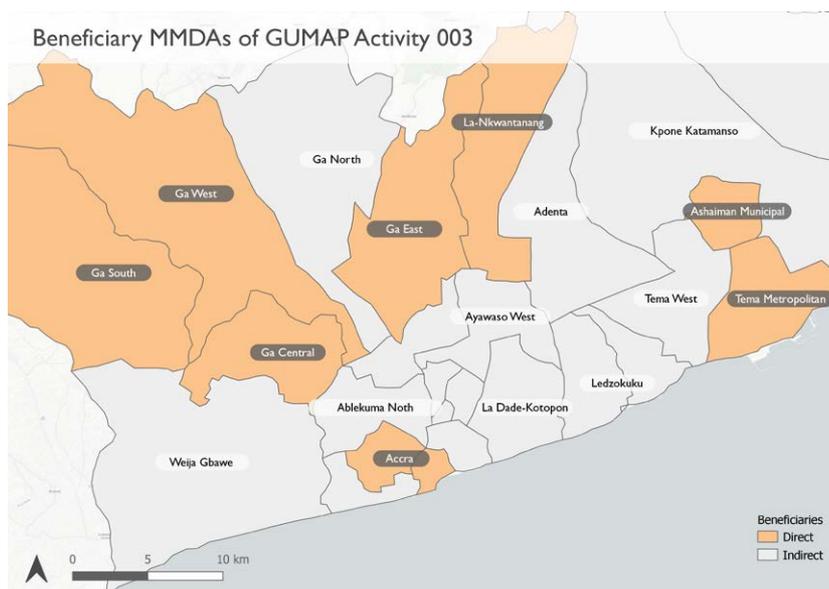


Figure 1 - Direct and indirect beneficiaries of activity 003

¹ Since vehicles only depart when they are full, the frequency of departures also provides an indication of demand.



There are currently 29 MMDAs in GAMA. Four of these are districts that do not have DoTs, leaving 25 MMAs with DoTs that can benefit from the project. Given the scope of the project and the varying capacity levels of the DoTs, it was expected that the level of engagement in the project will vary across DoTs. As agreed during the inception mission, the direct beneficiaries of this activity were the six MMDAs that were identified at the start of GUMAP, plus three additional DoTs that showed particular interest in the activity during the initial mission.



Figure 2 - Direct Beneficiaries

These 9 beneficiaries, referred to as the *Direct Beneficiaries*, were invited to nominate counterpart staff to spend a day or two shadowing the **Local Field Research Team** and getting familiar with their workflow. All other MMA DoTs are referred to as *Indirect Beneficiaries*.

Indirect Beneficiaries are meant to benefit from the following:

- Access to a "recording" of the workshops
- Access to all documentation material
- Access to data covering a) their jurisdiction and b) the network

3.2 Team Structure

The project was set up so that the data collection was carried out by a **Local Field Research Team** hired and supervised by the **Consultant**.

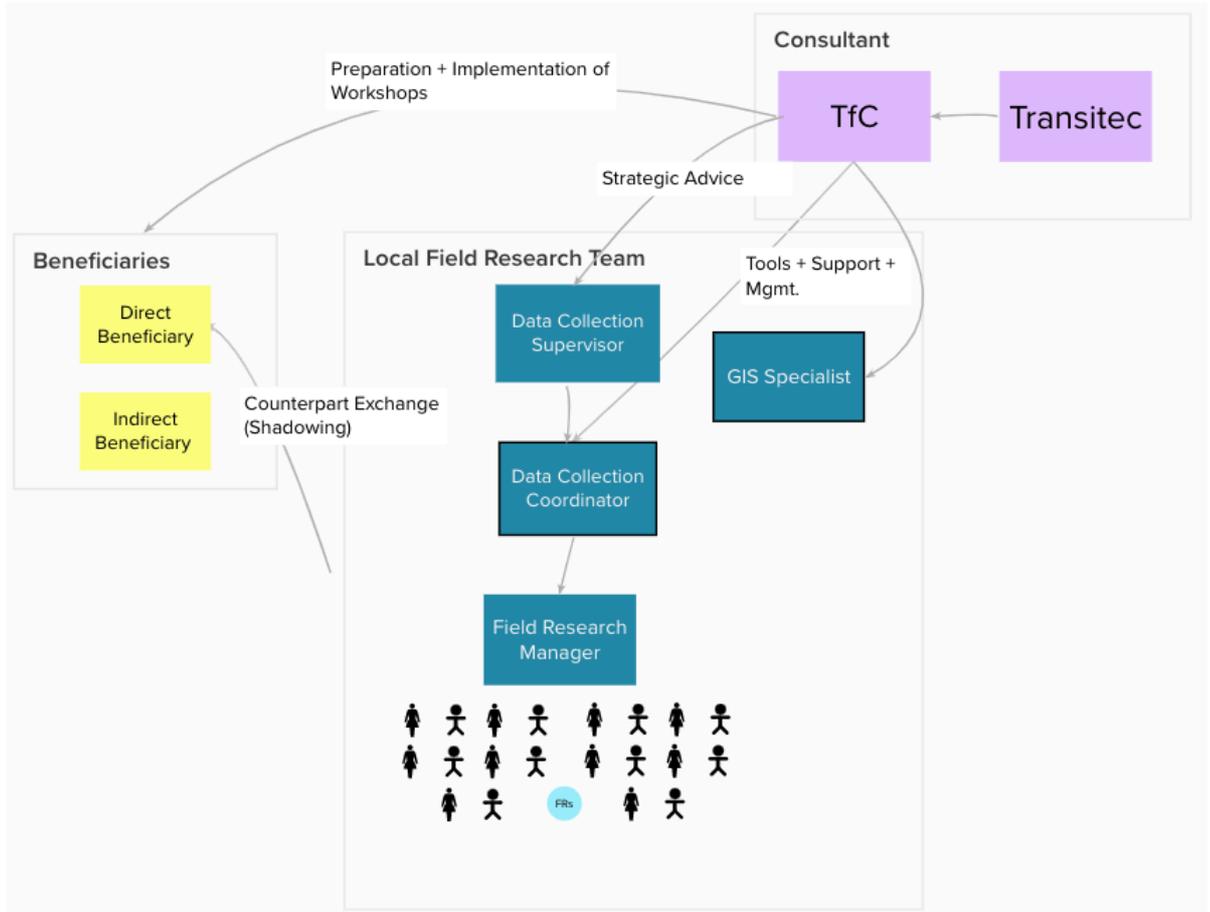


Figure 3 - Field Research Organization

- **Data Collection Supervisor (DCS):** a focal point at GAPTE, nominated by the client to lead the operation. It was agreed that the DSC would be Mr. Alex Johnson.
- **Data Collection Coordinator (DCC):** the main responsibility of the DCC was to assist the DCS in managing the data collection campaign, specifically:
 - Interviewing and hiring the Field Researchers (FRs), Field Research Managers (FRMs) and a GIS Specialist according to standards determined by the Transitec/TfC consortium;
 - administrative management (contracts/payment/HR issues) of the FRs, FRMs and GIS Specialist;
 - Assisting in obtaining permits, coordinating with transport unions and station supervisors, and finding solutions to other logistical challenges
 - Daily follow-up of technical progress and corrective measures.
- **GIS Specialist:** this person was responsible for using dedicated tools to clean and properly digitize the data received from the field. They needed to have local knowledge in order to make decisions regarding inconsistencies between GPS traces and the road network (retrieved from OpenStreetMap – OSM). Their work necessitated close communication with the Field Research Managers and the DCC.
- **Field Research Manager (FRM):** The Field Research Manager spent time between the field and the office. She used a digital dashboard (accessible through TfC’s web interface) to manage the field research and ensure that work was conducted according to the data collection strategy. Her responsibilities included:
 - Supervising a team of Field Researchers and their day-to-day field research activities



- Ensuring field research Key Performance Indicators (KPIs) were being met. KPIs included percentage of utilized time of field researchers, number of daily completed surveys, and integrity of completed surveys
- Assisting in defining field research protocols and data collection strategies with the DCC

3.3 Field Research Targets

This technical assistance **did not aim to map GAMA’s public transport network exhaustively**, but rather to collect data on a sample of trotro routes. It was agreed that this assignment would focus on 110 routes representative of a diversity of situations (location, length, passenger volumes) found across GAMA.

The routes included in the sample were selected by project beneficiary with the aim to:

- **Cover a diversity of MMDAS** to maximize opportunities for capacity building with the technical staff of a large number of GAMA assemblies. It was not possible to cover the 25 MMDAS of GAMA, but we aimed to survey at least one route in 80% of MMDAS.
- **Produce useful information** for planning and regulation purposes. In this regard, priority was given to the **routes that have the highest passenger volumes** (as these routes play the most important role in GAMA’s urban economy). Although there is currently no comprehensive data on passenger volumes by trotro routes, anecdotal evidence suggests that the bulk of passenger traffic is concentrated on a limited number of routes. Many of the busiest routes converge towards a few centers of economic activity (e.g. Kaneshie, Makola Market, Tema, Madina) that are unevenly distributed across MMDAs. This was considered in the route selection process to prioritize routes with high passenger volumes and connecting important commercial and transport hubs with residential areas.

The detailed methodology for the route selection is outlined in Interim Report 1.

The 110 routes thus selected were divided into two groups of 55 routes each:

- **High repetition routes** are routes for which we aimed to record at least four onboard trips per direction. Recording several trips on a route allows us to compare the characteristics and performance of the route at different times, and to measure potential variations. For “high repetition routes”, we aimed to record at least one trip per period of the day, and two trips during the morning peak period, which was considered to be the most significant period.
- **Low repetition routes** were assigned a lower target in terms of number of trips recorded, with only two trips per route and per direction. One trip had to be recorded during a peak period (either morning or evening) and one trip had to be recorded during the off-peak period.

In total, we aimed to record 330 trips per direction, i.e. 660 onboard trips in total (assuming that all routes operate in two directions). The following table summarizes the targets that were set for onboard surveys.

Table 1 - Onboard survey targets (per direction)

	Number of round trips recorded by route (onboard surveys)				Total round trips
	Morning peak 6 AM – 9 AM	Off-peak 9 AM – 3 PM	Evening peak 3 PM – 6 PM	Total by route	
High repetition routes (55 routes)	2	1	1	4	220
Low repetition routes (55 routes)	1 (or one in the evening)	1	(1)	2	110





Frequency surveys were organized by observation periods² of one or two hours:

- in the peak periods, the duration of observation periods was set at 60 minutes
- in the off-peak period, the duration of observation periods was set at 120 minutes. It was assumed that departures would be less frequent during the off-peak period, which required a longer observation period to obtain significant results.

In total, we aimed to execute:

- four distinct observation periods (of one hour each) during the morning peak for a total of four hours
- three observation periods (of two hours each) during the off-peak period, for a total of six hours
- four observation periods (of one hour each) during the evening peak period), for a total of four hours

These targets were set per route (not by direction). The team aimed to distribute observation periods evenly between inbound and outbound directions, but identified the need to retain some flexibility as operations can be very asymmetrical between two directions of a given route.

Table 2 - Frequency survey targets

Number of observation periods for frequency surveys (for each route)			
	Morning peak 6 AM – 9 AM	Off-peak 9 AM – 3 PM	Evening peak 3 PM – 6 PM
Number of observation periods	4	3	4
Duration of each period	60 minutes	120 minutes	60 minutes
Total duration	4 hours	6 hours	4 hours

3.4 Field Research Performance and Challenges

The following table presents a **breakdown of the actual number of valid surveys** that were carried out by survey type, mode of transport, and period of the day.

Agency		Morning Peak 6am – 9am	Off Peak 9am – 3pm	Evening Peak 3pm – 7pm	Total
Onboard surveys	<i>Trotro</i>	246	171	143	560
	<i>Shared Taxi</i>	30	29	17	76
Frequency surveys	<i>Trotro</i>	454	386	333	1173
	<i>Shared Taxi</i>	82	59	53	194

The discrepancies between the targets presented in the previous sub-section and the actual number of surveys carried out can be explained as follows:

² Observation periods on different days were carried out for two reasons: (1) to optimize use of FR time (as explained in Section 3.5), and (2) to reduce anomalous observations. Demand patterns may vary on different weekdays, and distinct observation periods on different days allow us to remove outliers and obtain average values that are more representative of a 'typical' weekday.





- **Some routes only operate during limited time windows every day**, reflecting commuting patterns. This was already observed during AccraMobile and confirmed through the present exercise at a large scale. The operating hours of some routes are highly dependent on the nature of the demand that they serve. Some direct routes connecting distant residential suburbs to the city center, for instance, were found to be active only for a few hours every day during the peak periods. Outside of these periods of high demand, passengers typically have to change vehicle at an intermediate station to reach their destination. This was for instance the case of the Amasaman to Tema Harbour route, which is dormant outside of the peak periods.
- **Some routes operate only in one direction**, or operate in alternating (and exclusive) directions over different periods of the day. In the case of routes connecting mainly residential areas to commercial centers, for instance, trotros take passengers away from residential areas early in the morning, and only start bringing them back to their place of residence later in the day. It is generally difficult to find a public transport vehicle travelling towards purely residential neighborhoods during the morning peak period (the few passengers travelling in that direction have to take a taxicab, an okada, or walk). However, routes serving neighborhoods with mixed land use tend to have more balanced operating patterns, and run services in both directions throughout the day.
- **Some routes only operate out of a formal station in one direction**, and load from the roadside in the other direction. It is difficult to carry out frequency surveys at roadside loading points, because stopping locations tend to be more spatially scattered and departing vehicles may not be identified accurately.
- The main routes on which these challenges were encountered are the following:
 - Circle Station to Manhean (operates in the evening peak only)
 - Tema Harbour to Amasaman Trotro Station (does not operate in the evening peak)
 - Amasaman Trotro Station to Tema Harbour (operates at dawn only)
 - Paradise to Ablekuma Curve (the route starts operating after noon)
 - Achimota Station to Tema Community 1 (the route does not operate during the evening peak period)

3.5 Lessons Learned and Recommendations

- The exact list of routes to be surveyed was set at the start of the assignment, based on a rapid identification survey carried out during the inception mission. While this avoided any uncertainties regarding the exact scope of work and the outputs to be delivered by the Consultant, it also resulted in a sub-optimal use of project resources. A non-negligible amount of FR time was lost trying to find routes that did not exist (in one and sometimes two directions) and waiting for vehicles to board on routes with very low frequencies. Setting a precise list of routes to survey is warranted when the network is already known, and the goal of the survey is to assess the performance of specific routes (e.g. for regulatory purposes). However, as the present assignment was largely exploratory in nature, this approach proved overly rigid and resulted in a loss of efficiency.
- Similarly, over-specifying the number of instances to be recorded by time period turned out to be a straitjacket for the organization of fieldwork. FRs spent a lot in the field waiting for services that did not exist, which negatively impacted their ratio of productive time over total worktime. Overall, the number of FRs days spent to achieve the minimum targets set at the start of the project was exceeded by over 170 days (out of 400 days, that is +43%).
- The productivity of field researchers was affected by the combination of the two constraints presented above. On the one hand, these constraints ensured compliance with an agreed-upon scope of work. On the other hand, they resulted in FRs recording a smaller volume of information than would have been possible if they had adopted a more flexible workflow. For instance, FRs could have been instructed to survey new routes when routes originally included in the scope of work proved to be inexistant or dormant when they reached their station of origin. Using such an adaptative strategy makes it more difficult to control the exact number of repetitions recorded on each route but could allow the field research team to cover more ground overall.



- Finally, it might have been simpler to record frequencies over a continuous day of operations for each route, instead of breaking down observation periods into separate blocks. The use of multiple short observation periods was meant to optimize the use of FRs' time, allowing them to insert frequency surveys in between onboard surveys, but these benefits did not materialize given the overall fairly rigid design of the survey plan.

4. Data Analysis

In this section we utilize the data collected to undergo various types of analysis. We look at supply, demand, and network performance.

4.1 Transport Supply

Our analysis of public transport supply is not based on all routes in GAMA; it is based on a sample of 192 unique Trotro route legs and 32 unique Shared Taxi route legs.

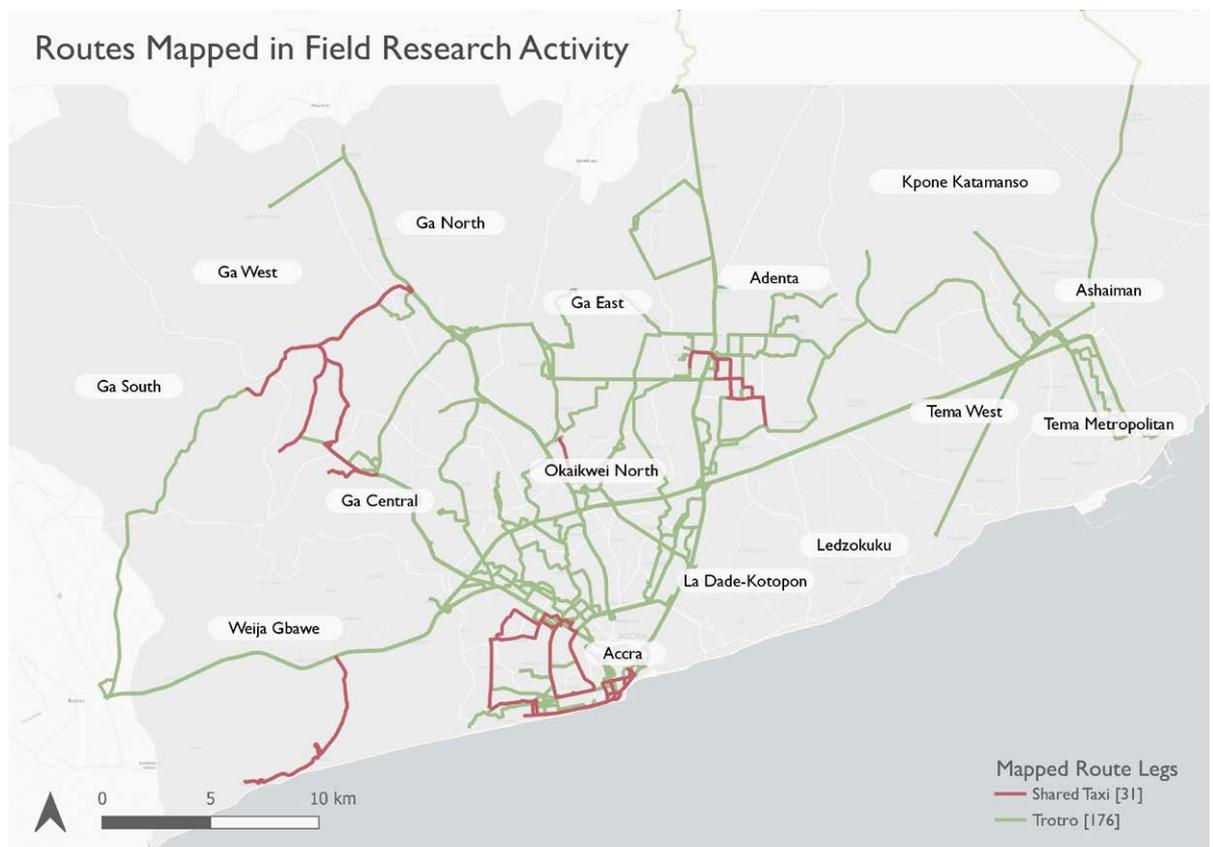


Figure 4 - Routes mapped throughout field research



Routes Used in Analysis

The routes used for the analysis are a **sample** of routes in Greater Accra.

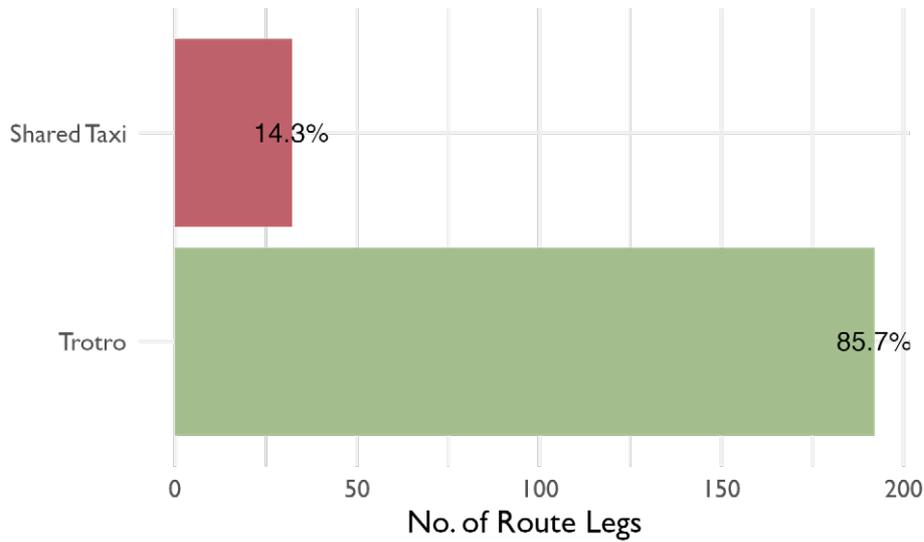


Figure 5 - Routes used in analysis, broken down by mode

4.1.1 Mode characteristics

The sample of routes was used to analyze operational characteristics of both modes. We look at route lengths, stopping patterns, travel speeds and frequencies. Table 3 shows average statistics by mode.

Trotros operate longer distances, but shared taxis are more frequent. This may be due to their smaller size (which allows them to fill up faster)

Table 3 - Mode operational characteristics

Mode	No. of routes in analysis (route legs)	Average route length (km – one way)	Average no. of stops per route (one way)	Average stops / km	Average frequency (vph)		Average commercial speed (kph)	
					AM Peak	PM Peak	AM Peak	PM Peak
Trotro	98 (192)	16.4	8	0.7	2.7	2.9	15.2	18.3
Shared Taxi	16 (32)	5.5	3	0.6	3.5	4.2	18.4	13.2

4.1.2 Route Length

This subsection looks at the distribution of route-leg lengths. The length is calculated from the GPS traces collected from the onboard surveys. Raw GPS traces are made of a sequence of points, which can be located slightly off the road due to the level of accuracy of GPS sensors. The first step therefore consists in realigning these points (“snapping”) these points to the road network, in order to accurately calculate the length of a route.



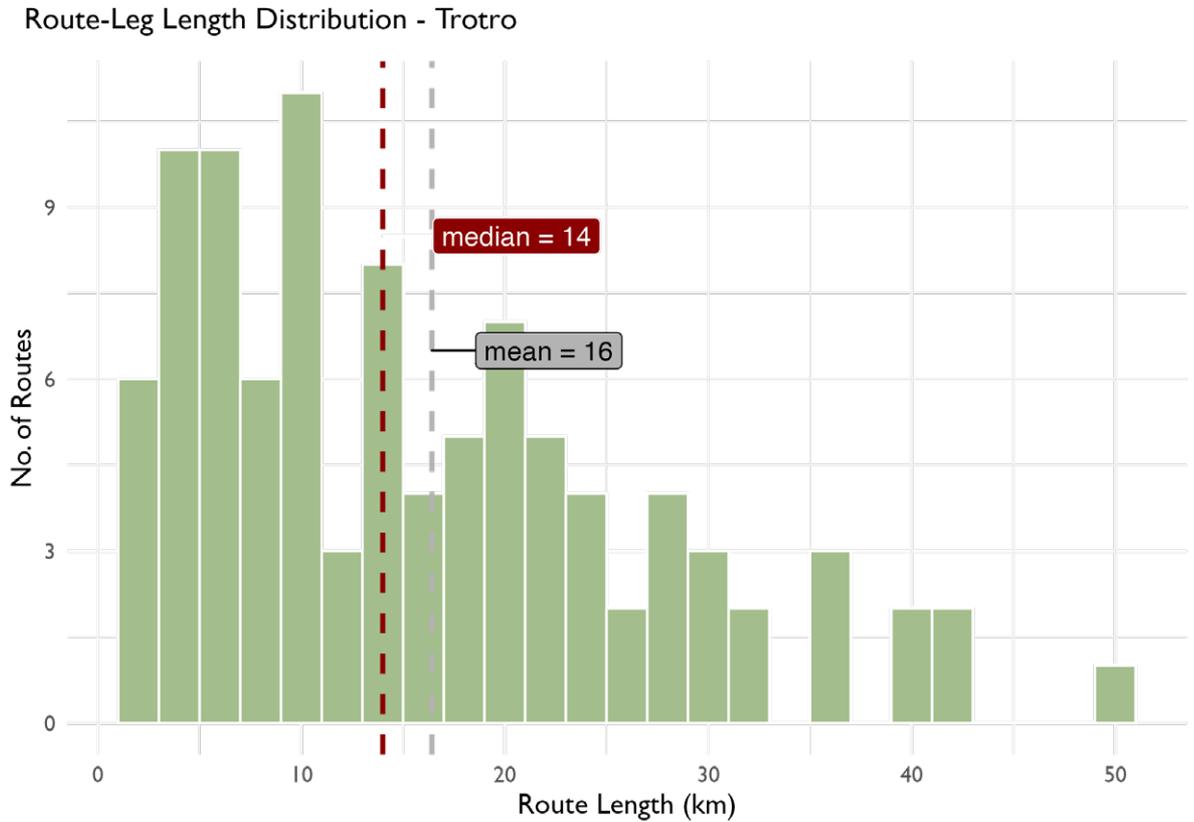


Figure 6 - Route length distribution – Trotro

We observe that intra-urban trotro routes have an average length of 16km (one way). The distribution shows a left skew, with a median of 14 km. Most trips are below 30km.

4.1.3 Headway

Headway is calculated from frequency surveys. Field researchers go to the terminal and record consecutive departures for each route-leg. This data is then used to calculate headway for each route-leg throughout the day.

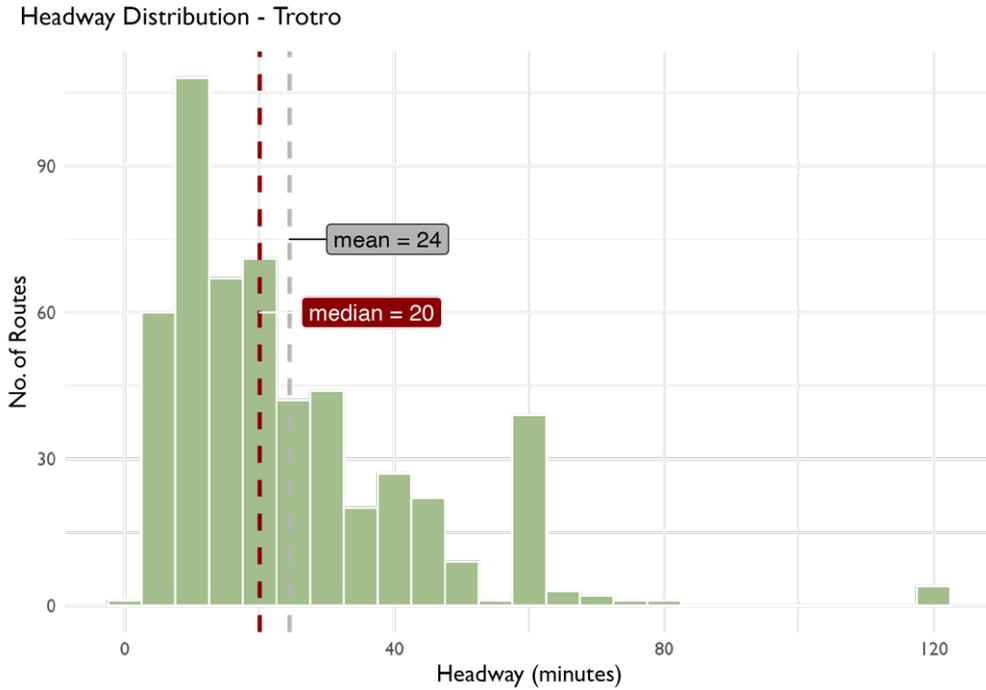


Figure 7 - Headway distribution for all trotro routes

The average headway for Trotros is 24 minutes, although the distribution is heavily skewed by a few trotro routes that have a very high headway (50% of trotro routes have a headway below 20 minutes, and 75% have a headway below 32 minutes).

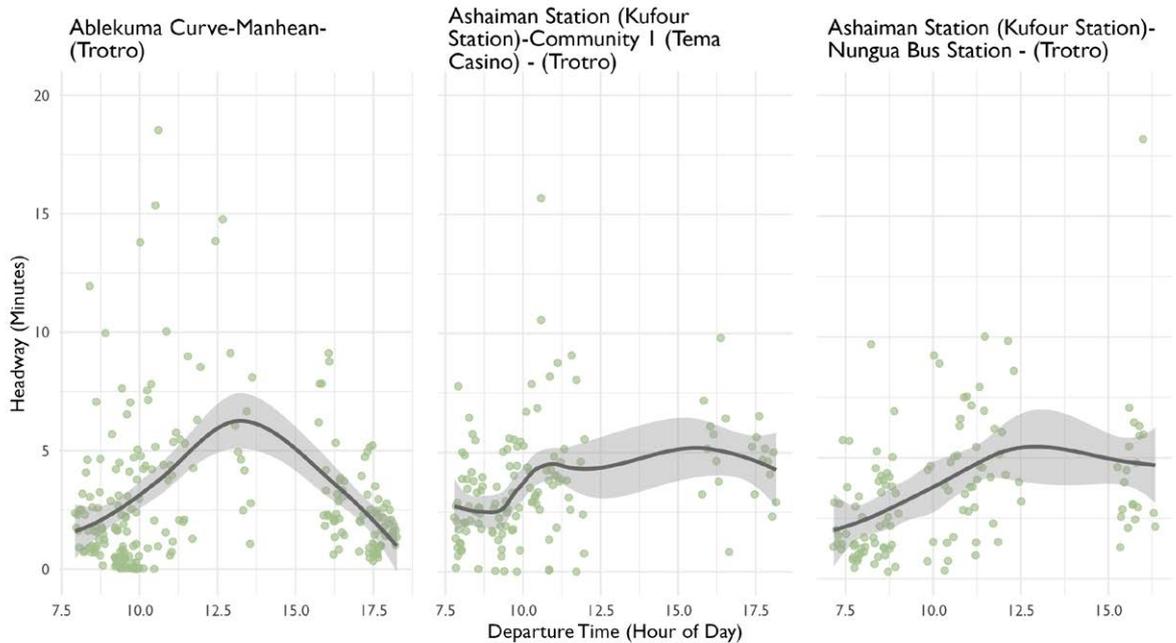


Figure 8 - Headway (dots) and fitted headway (line) of three select trotro routes throughout the day

Service availability varies throughout the day. Trotros are 'fill-and-go' services that depart when full, so headway values are higher in the off-peak. Figure 8 shows the headway distribution of three select trotro route-legs throughout the day. There is a general trend of relatively low headway in the peak periods, which increases in the off-peak period. This trend is most prominent in the Ablekuma Curve – Manhean route leg. The other two route-legs show smaller headway (higher frequency) in the morning periods



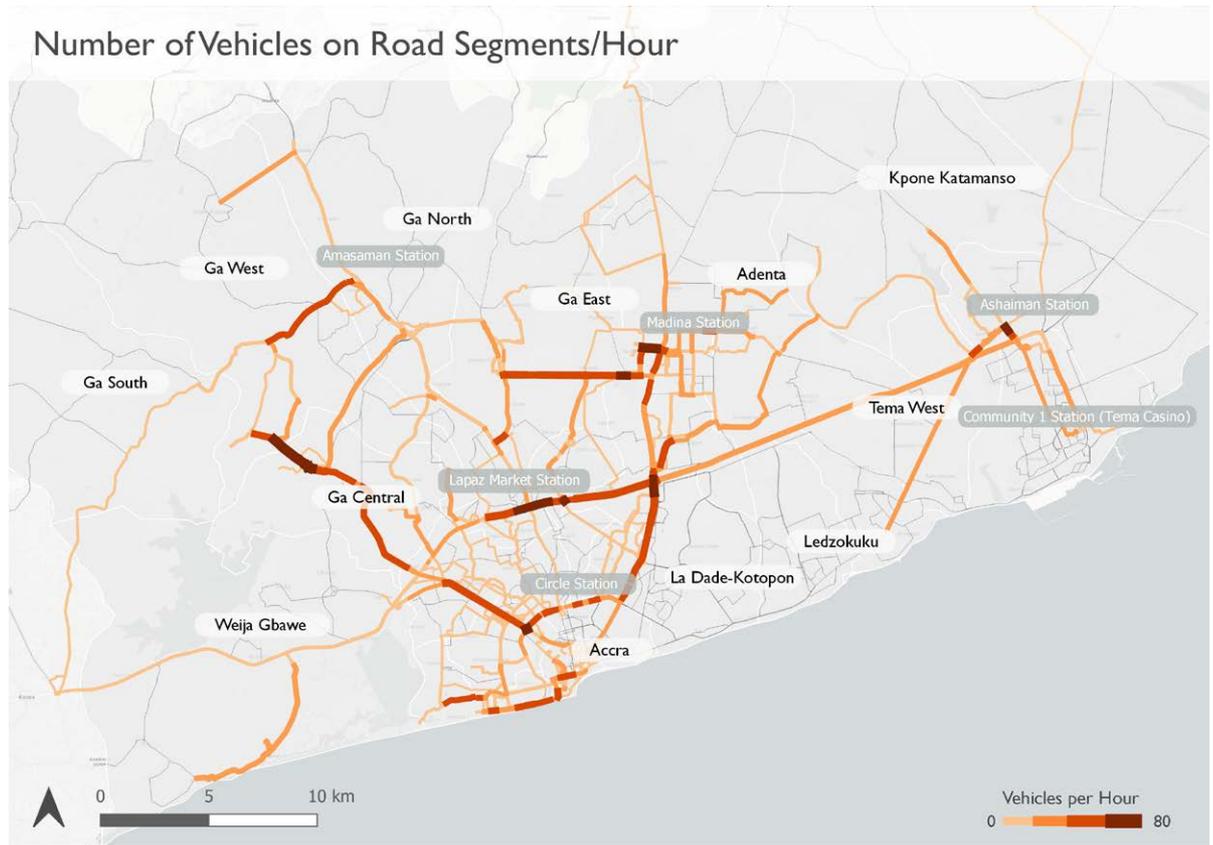
relative to the evening periods, which indicates that demand is higher in the morning. One explanation could be that the destinations of these route-legs are popular daytime work destinations.

4.1.4 Spatial Distribution of Public Transport Services

Map 1 shows the number of Trotro and Shared Taxi vehicles passing on each road segment in the morning peak period. It is calculated using the route itinerary and the frequency data per route. It is important to note that these projections only aggregate traffic for the routes surveyed during this project. The actual number of vehicles per hour operating on any road segment is bound to be higher in reality because it will also include vehicles operating routes that were not surveyed as part of this exercise. It is clear that the main arterials connecting central Accra to the neighboring areas have a high number of vehicles. This includes:

- Accra – Tema Motorway
- Legon East Road and Liberation Road (connecting to Ga East and Adenta)
- Dr. Busia Highway (connecting to Ga Central)

The results can be used to determine where to re-allocate road space to public transport. Dedicated lanes for Trotro and Shared Taxi services could greatly improve travel times and, in turn, accessibility using these modes. Accessibility is discussed further in Section 4.3.3



Map 1 - Public transport vehicles per hour on recorded routes - Morning peak period

4.2 Transport Demand

4.2.1 Stopping Patterns

Route stopping patterns are obtained from onboard surveys. During these surveys, the field researchers determine stop locations, and identify the number of people boarding and alighting at each stop.



Stop Distribution - Trotro

The number of stops is calculated for each route leg, as routes may experience different stop patterns on inbound and outbound legs. The plots show the **mean** and **median**.

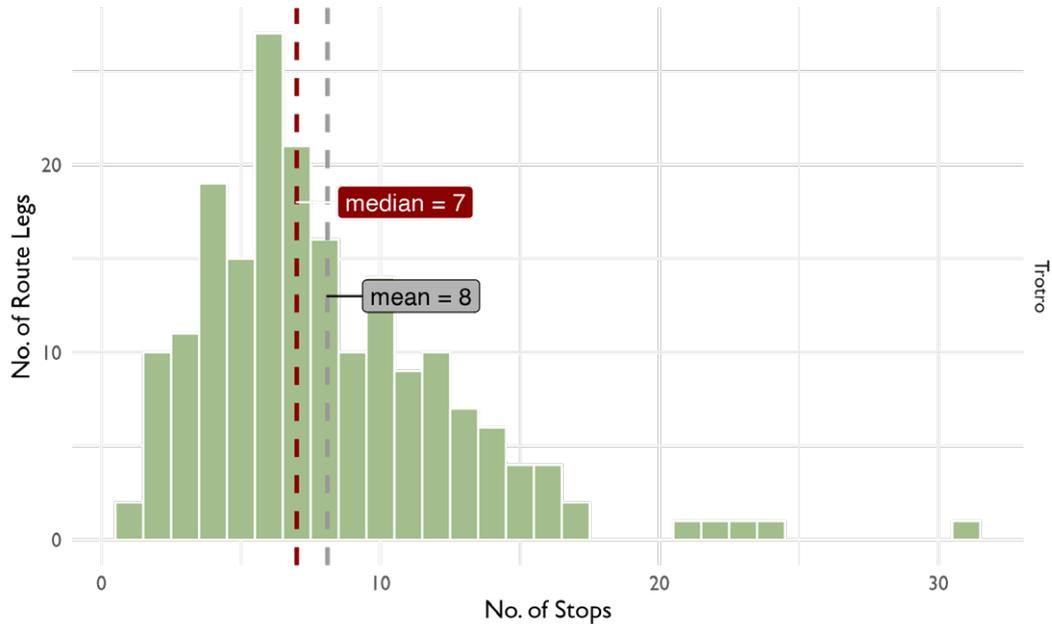


Figure 9 - Stop distribution by mode

Stop Density - Trotro

Stop Density is calculated for each route leg, as routes may experience different stop patterns on inbound and outbound legs. The plots show the **mean** and **median**.

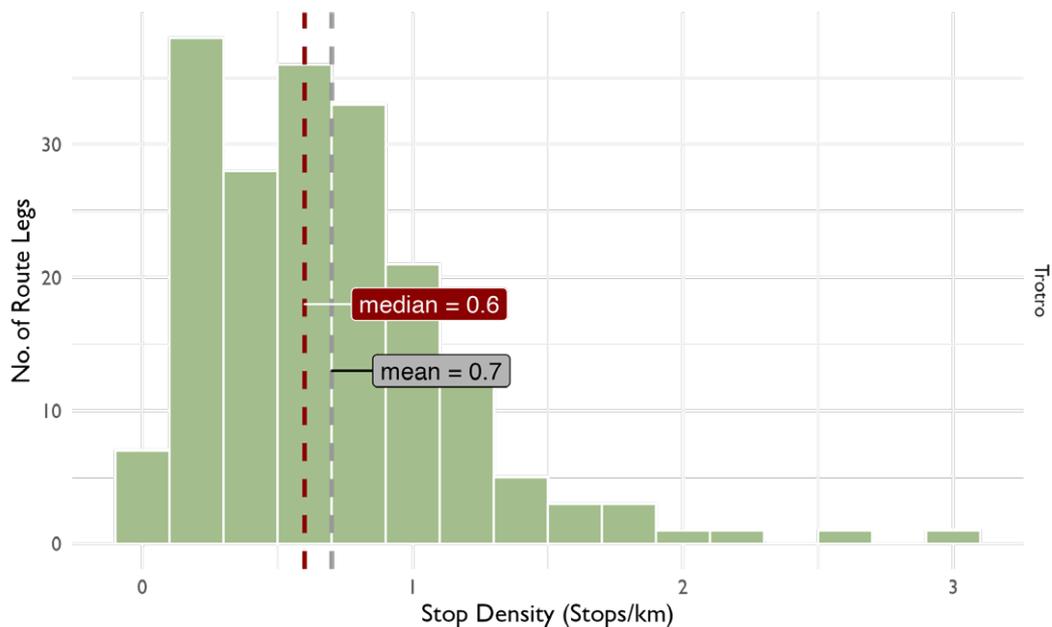


Figure 10 - Stop density distribution by mode

Trotro routes in our sample stop 8 times on average, but there is a large variation between different routes. This variation can be attributed to route length. Calculations for stop density show that most routes have between 0.5 and 1.5 stop/km.





4.2.1 Boarding and Alighting Patterns

Erreur ! Source du renvoi introuvable. shows the average number of passengers boarding and alighting from public transport during the morning period. Boarding and alighting data for each route-leg, recorded during onboard surveys, is multiplied by headway data for that route-leg in order to determine total number of boarding and alighting figures during different times of day.

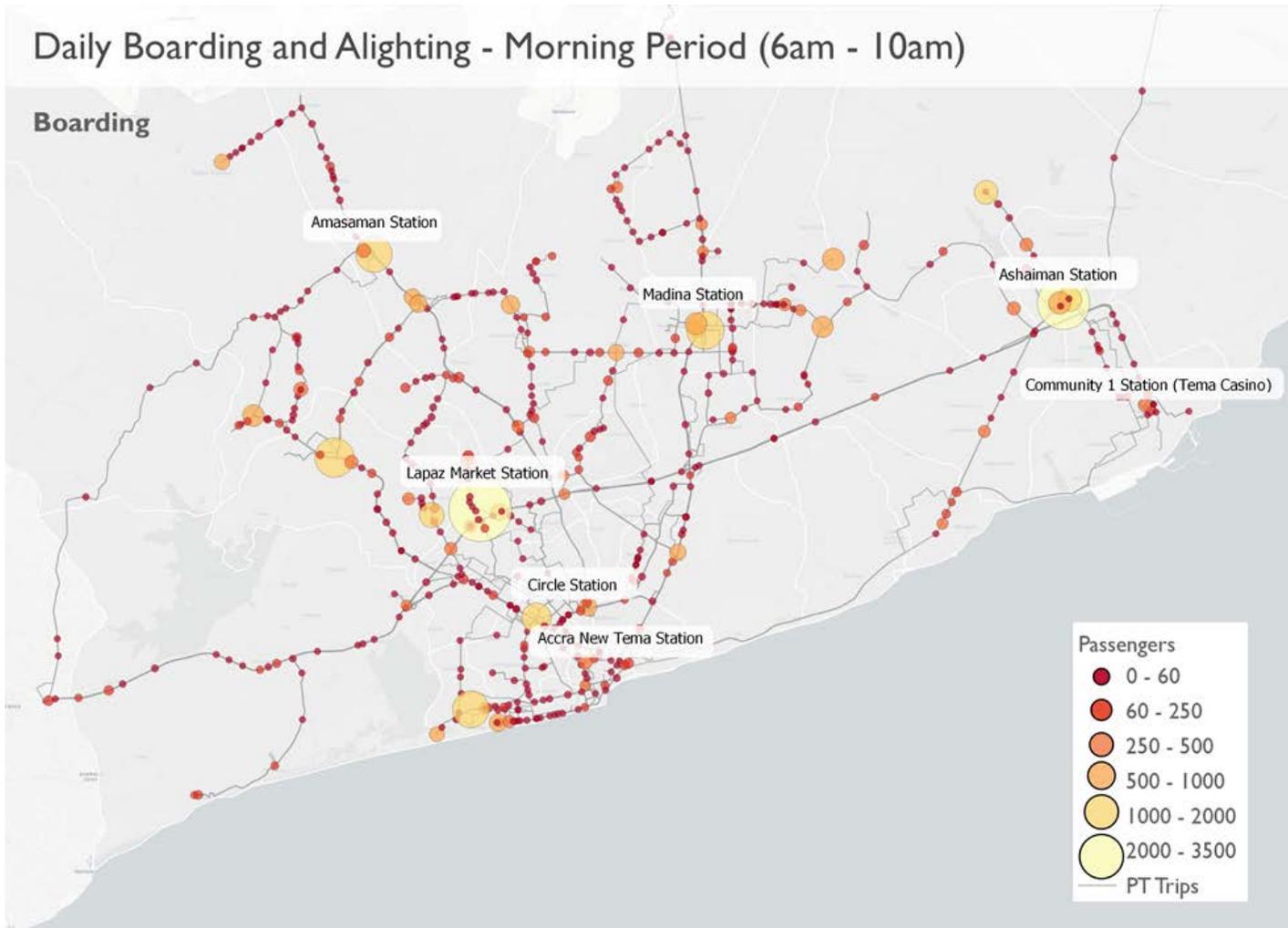


Figure 11 – Recorded boarding patterns during the morning peak period



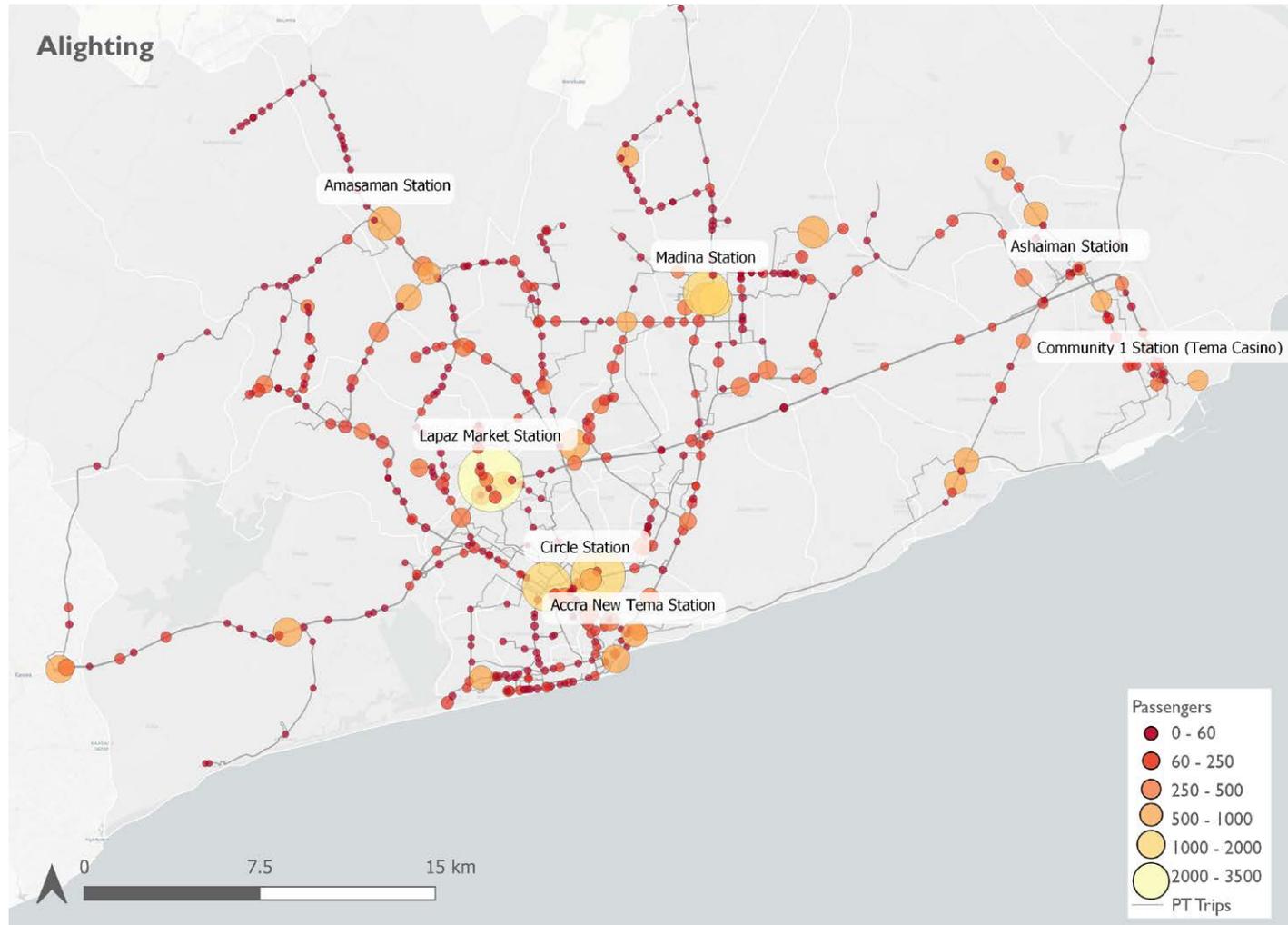


Figure 12 – Recorded alighting patterns during the morning peak period

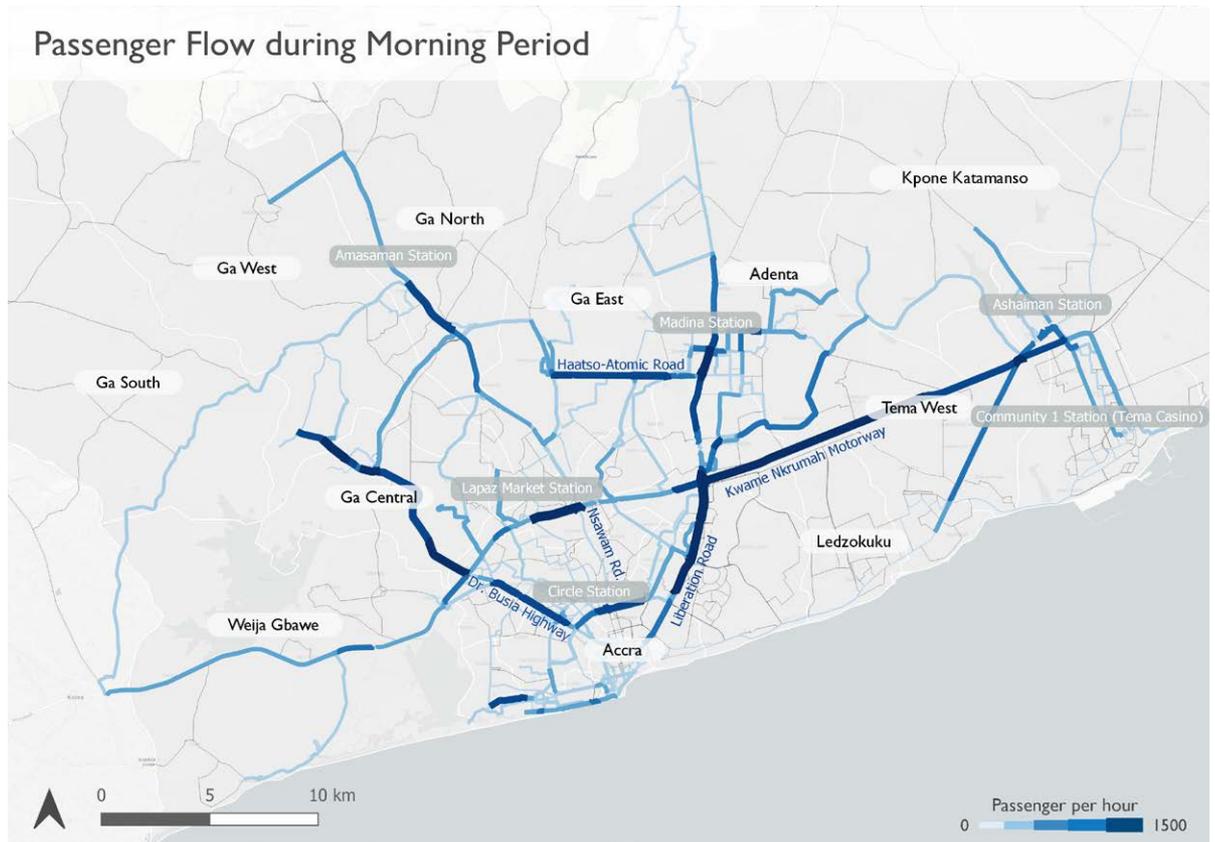


The results give us an indication of the important hubs in the network. Lapaz Market and Madina appear to be important interchange hubs, as they experience high numbers of both boarding and alighting. The high number of passengers alighting at Circle and Accra New Tema indicates is an indicator that central Accra is a popular employment destination. Ashaiman exhibits more Boarding than Alighting in the morning period, indicating that it is more of a residential location.

The data can be used to identify the most important hubs, and the level of patronage at these hubs. It can be used to compare demand to capacity of these hubs, and to determine which hubs investments should be targeted at to improve interchanges and improve the overall travel time and passenger experience.

4.2.2 Ridership of Public Transport Services

The movement of passenger using public transport can be seen in Map 2. Passenger flow is calculated using the boarding and alighting data obtained from onboard surveys in combination with headway data obtained from frequency surveys. We use the boarding and alighting data to determine the number of people on a vehicle at any given point for each time of day. The results are then multiplied by headway data to get the total number of passengers on each road segment. It is important to note that these projections only aggregate traffic for the routes surveyed during this project. The actual number of passengers per hour operating on any road segment is bound to be higher in reality because it will also include passengers travelling on routes that were not surveyed as part of this exercise.



Map 2 - Passenger flow (Morning peak period)

Passenger flow is a function of both supply (what services are available) and demand (where do people live, where do they work, what is their preferred mode of travel). The results show that there is heavy commuting between Accra and Tema through the Accra Tema motorway. The main arteries connecting central Accra to the northeast and northwest regions of GAMA also carry a relatively high number of passengers.



4.3 Network Performance

4.3.1 Travel Speeds

This subsection presents an analysis of average commercial speed for trotro trips. This analysis is based on GPS data collected through onboard surveys. The time and distance between GPS points is used to calculate average speed between locations.

Travel Speed Distribution - Trotro

Speeds are calculated for each route leg, as routes may experience different congestion patterns on inbound and outbound legs. The plots show the **mean** and **median**.

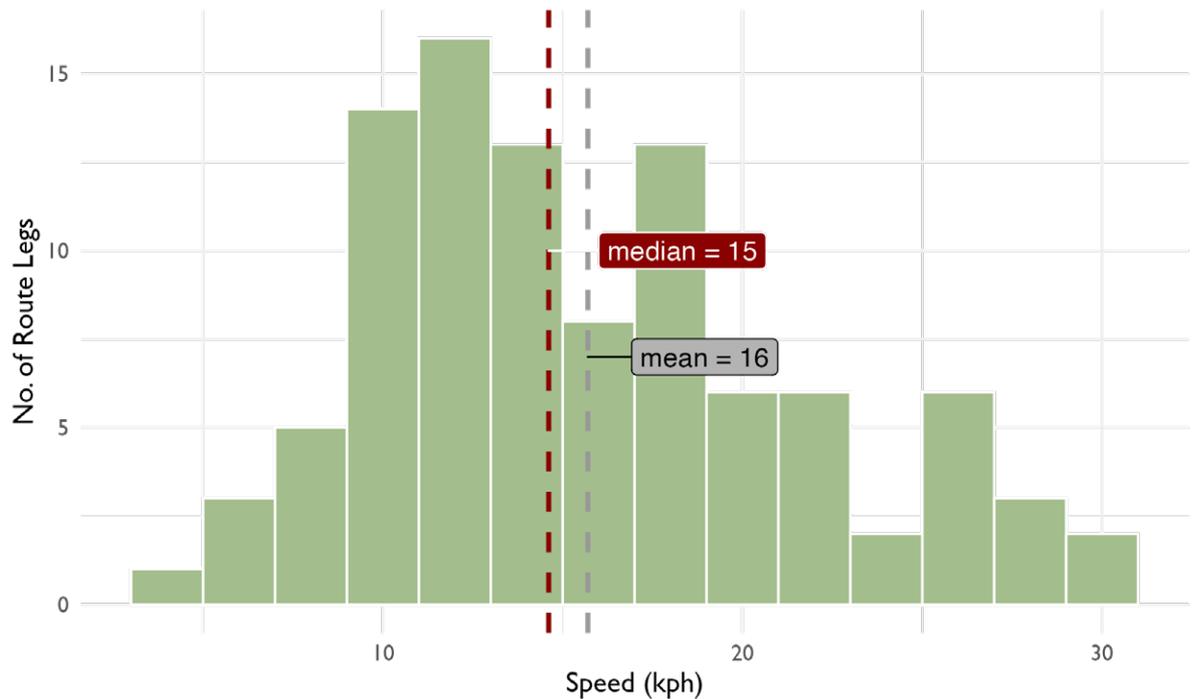


Figure 13 - Travel speed distribution by mode

Trotro trips have an average speed of 16 kph. There are a few trips that bring up the average with high average speeds. These are trips that operate more trunk services on larger roads with long uncongested stretches of road.

The following map shows the average speed of trips recorded during the morning peak period by segment of the road network.

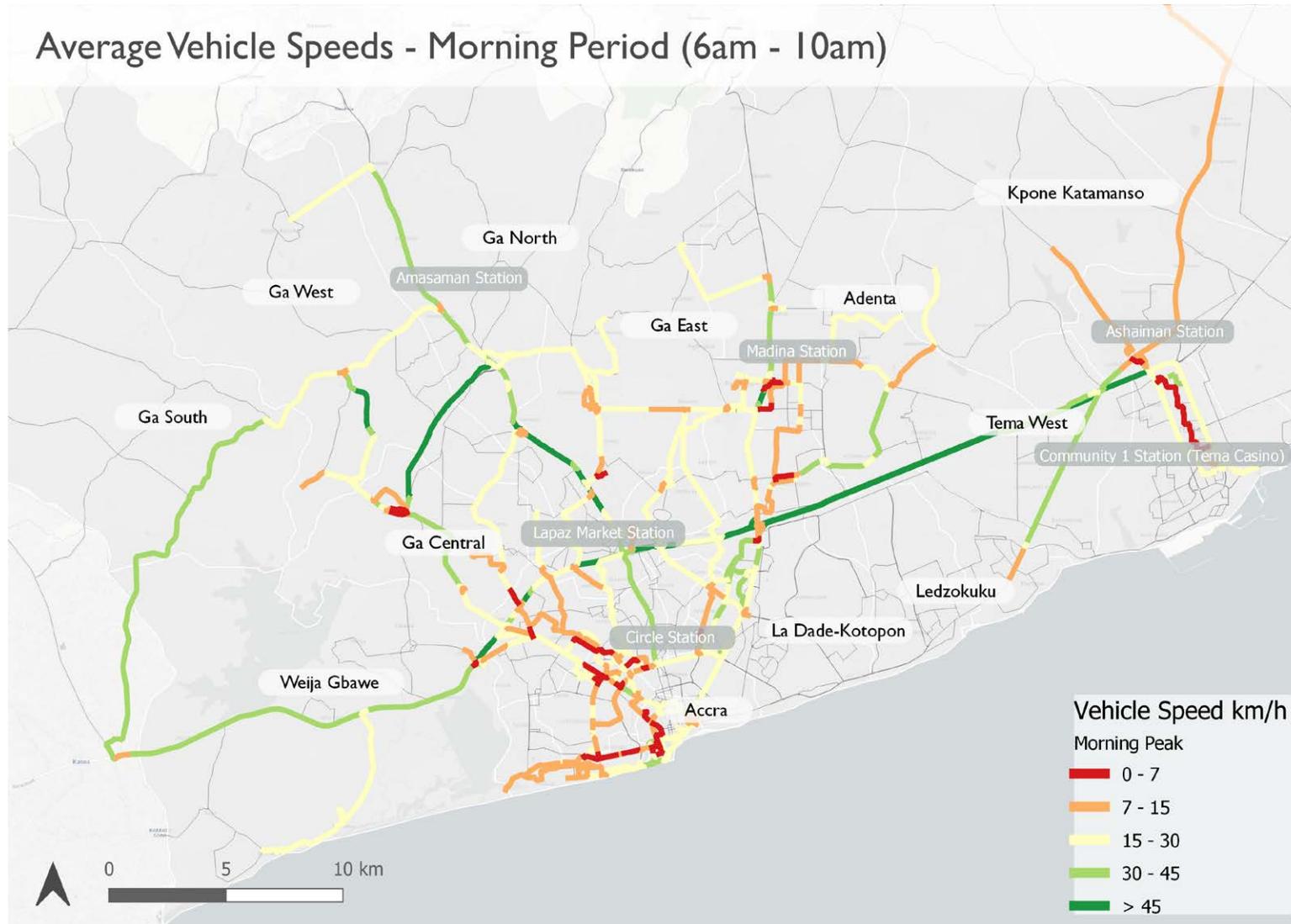


Figure 14 – Average commercial speed by road segment





4.3.2 Fares

Trip fares are obtained during onboard surveys.

Figure 15 and **Erreur ! Source du renvoi introuvable.** show how trip fares vary with length and duration. We can see that both Trotros and Shared Taxis have distance-based fares, although there are some trips that have the same length but different fares. This could be due to difference in demand, or in congestion along the route. Shared Taxis are more expensive than Trotros on a per km basis. This is to be expected since Shared Taxis have lower capacity and can be more efficient in short journeys as they fill up faster than Trotros.

Trip Fare vs Trip Length

For each trip, we calculate the average fare throughout the day

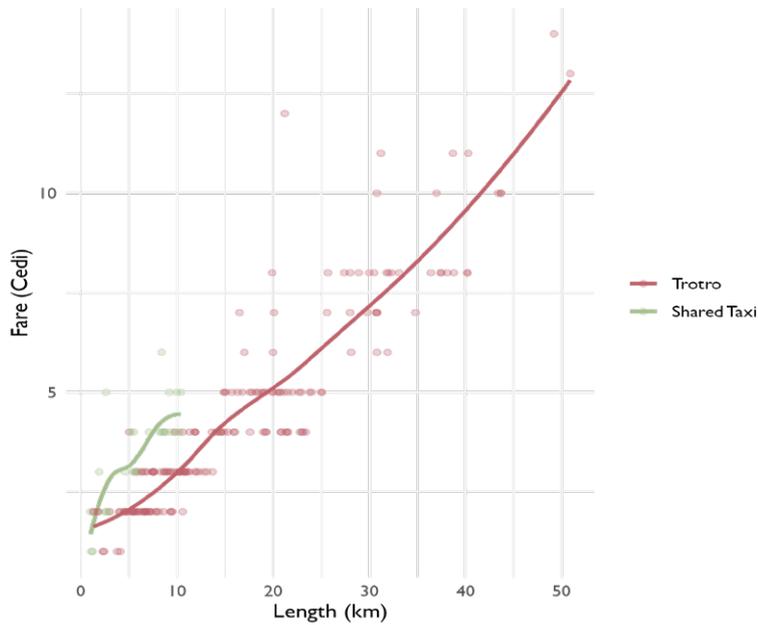


Figure 15 - Single trip fare vs trip length

Trip Fare vs Trip Duration

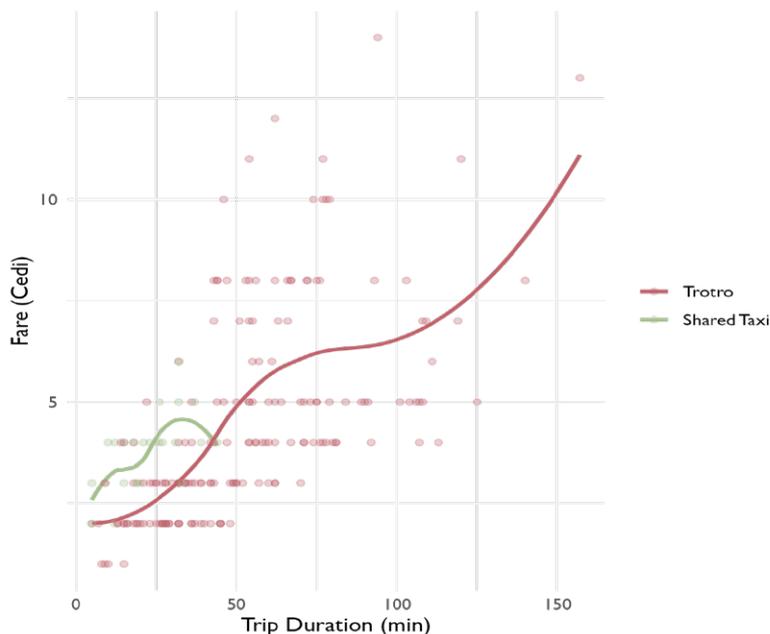




Figure 16 - Single trip fare vs trip duration

4.3.3 Accessibility Analysis

Accessibility analysis can show how the public transport network facilitates access to different parts of the city. Map 3 to Map 6 visualize point-based accessibility for specific terminals during the morning period (8:00am). The isochrones represent areas that can be reached within 15, 30, 45 and 60 minutes from each terminal. Such an analysis is done using a GTFS feed³, a routable road network, and a routing engine. In our case we use the OSM road network for Greater Accra and OpenTripPlanner, an Open-Source routing engine that enables multi-modal trip planning⁴. The maps can show the reach of different terminals and highlight how access to different parts of the city greatly varies depending on where you live.

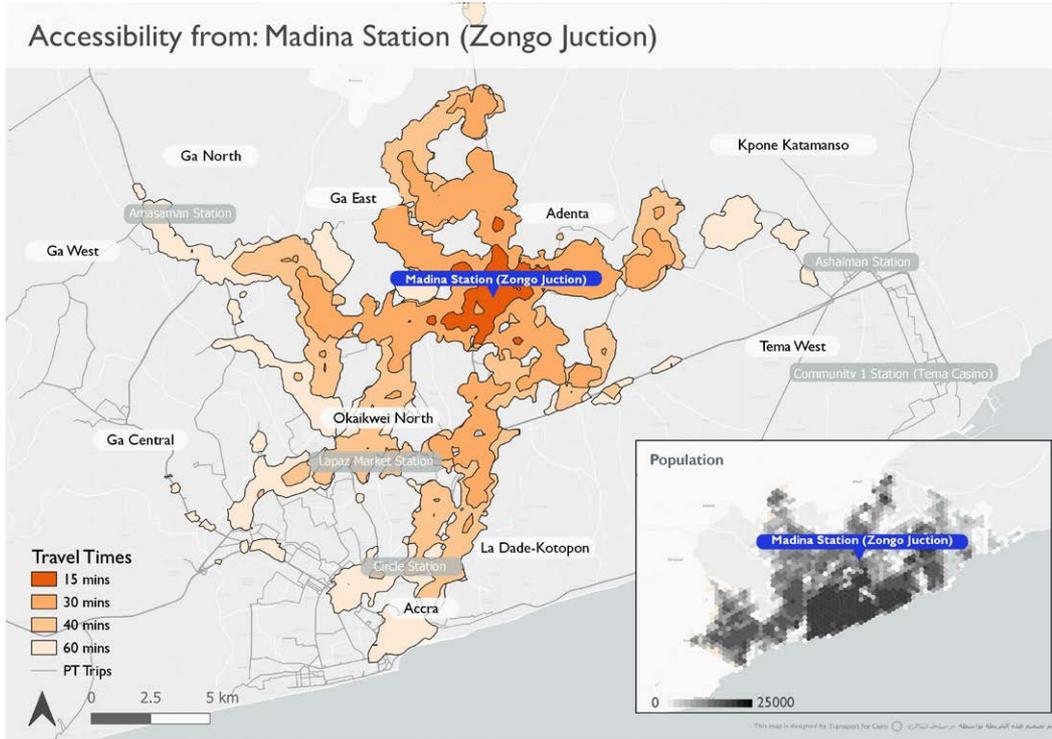
We can see from Map 3 that Madina Station offers good service to all parts of GAMA, especially to the South and West. Good service is a product of [a] direct services operating from the terminal, and [b] good connections with other terminals. Connectivity can be assessed by looking at the shape of the isochrones; long thin lines indicate direct services with no connections, whereas a rounder shape is normally an indication of good connectivity. For example, from Map 5 we see isochrones from Accra New Tema Station reaching Adenta and Ga Central, but their shape indicates that there is poor connectivity to terminals along the way. Even though services operating from Accra New Tema Station to Adenta may pass by other terminals/stops along the way, the waiting time for transfers at these stops may be too high, making journeys with transfers inefficient⁵.

The analysis would benefit greatly from spatial data on job locations, healthcare, education, or other points of interest. This data could be used to estimate variations to access to jobs and services across the GAMA, and this could be used straight away to pinpoint which areas require better services.

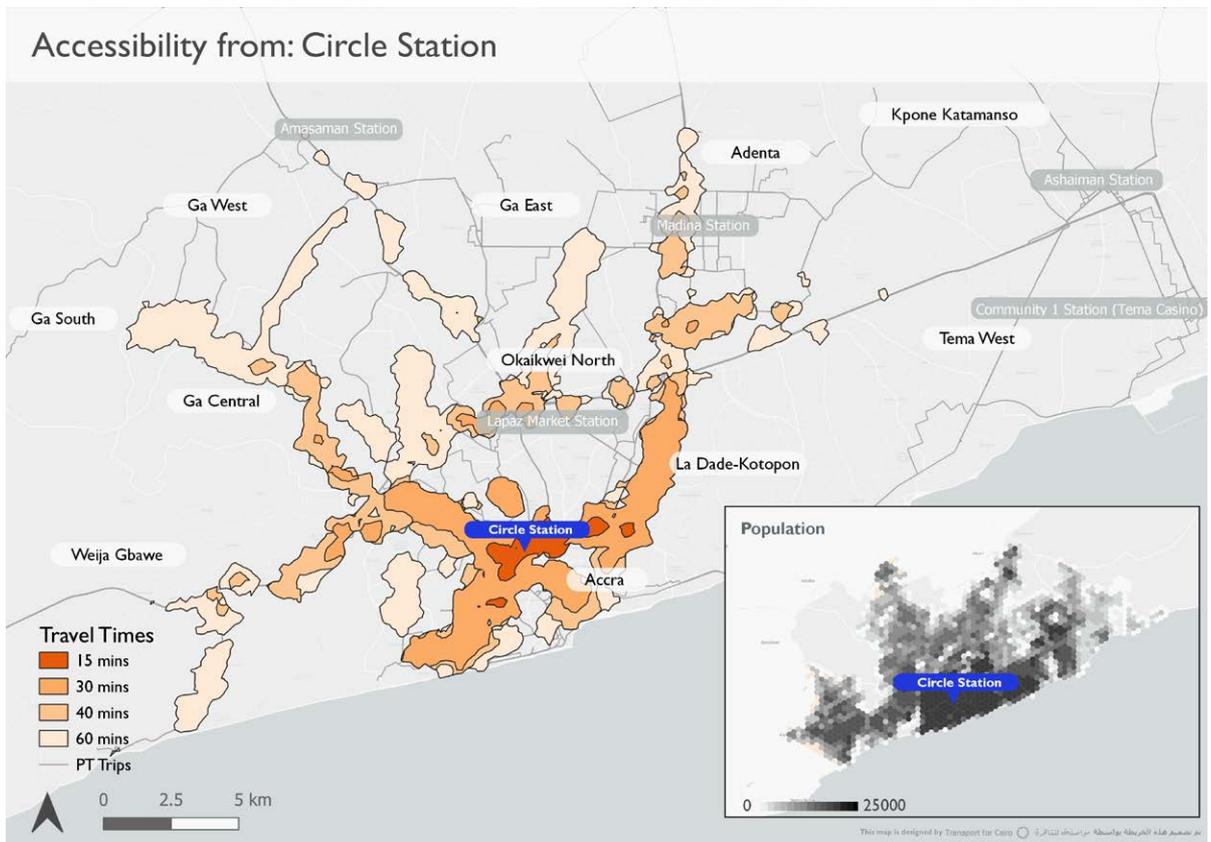
³ GTFS feeds capture the geographic path, frequency, and travel time along each route. As well as providing detailed data on public transport supply, they can be consumed by multimodal journey planners to recommend itineraries

⁴ OpenTripPlanner consumes a GTFS feed with standardized stops. Passengers are only allowed to board and alight at these stops. Our gtfs feed has a set of standardized stops since we cannot model the entire road network as stops. The stop locations are based on boarding and alighting hotspots, and we try to have a stop every 300-500 meters (but this varies depending on density of each area. Ideally, we would be able to model any location on the road network as a stop, but this is not currently possible.

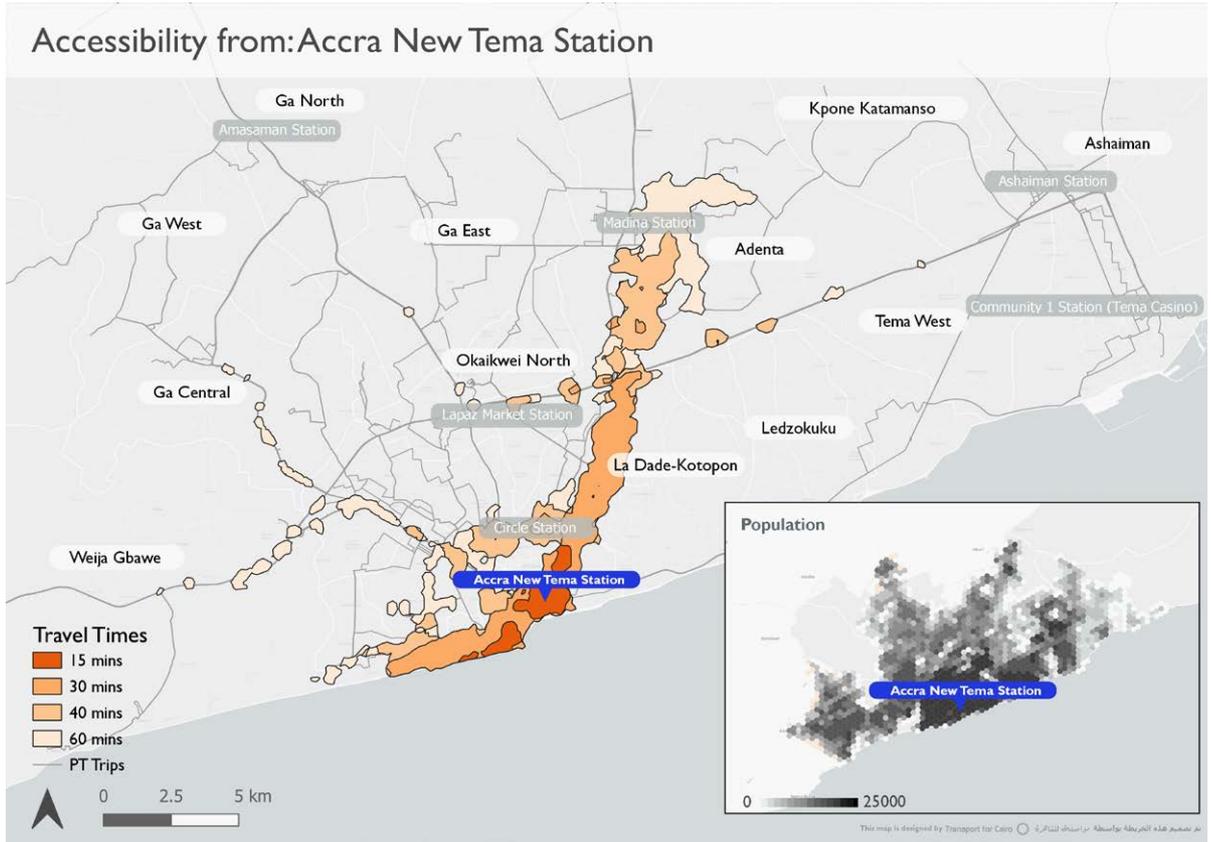
⁵ It is important to remember that this analysis, like all others, is based on a sample of routes in GAMA. Repeating the analysis with all routes may provide better results, especially if all feeder routes are used.



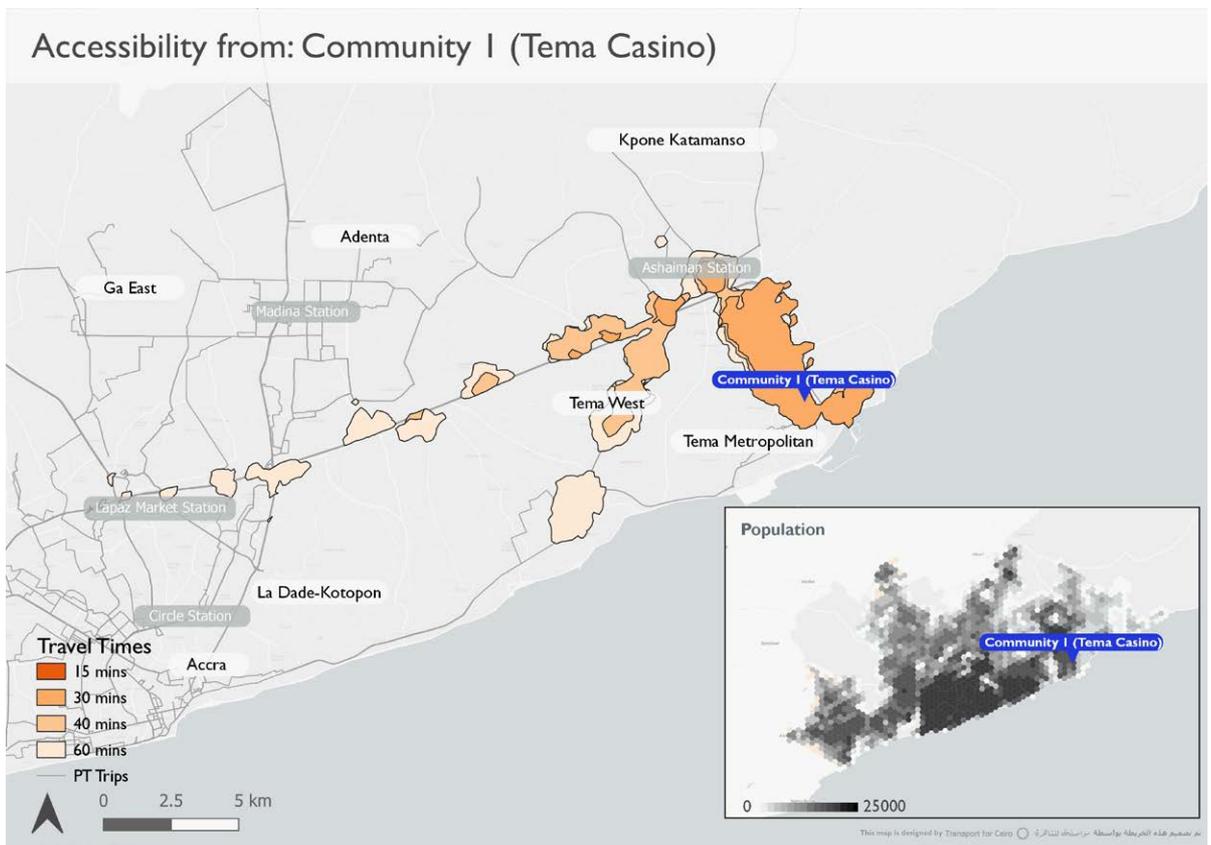
Map 3 - Point-based Accessibility – Madina Station (Zongo Junction)



Map 4 - Point-based Accessibility – Circle Station



Map 5 - Point-based Accessibility – Accra New Tema Station



Map 6 - Point-based Accessibility – Community 1 (Tema Casino)



5. Data Sustainability Strategy

The data collected in this project offers a glimpse of public transport operations at a specific point in time. It is based on a sample of routes in GAMA, and so a more accurate picture would survey all routes in the area. The data could also be outdated in a relatively short period of time, because:

- Urban growth leads to changes in demand patterns (in particular at the fringes of the urban area)
- Supply evolves dynamically to adapt to changes in demand

To ensure the existence of reliable data for transport planning, a data sustainability strategy needs to be put in place. Below we outline some of the foundations in this strategy

5.1 Processes

Setting a clear plan for data collection and update is the most important skill to have in a transport department aiming to achieve data sustainability. Other details such as the software used, structure of the data, hardware for field data collection can be concluded only after having a first draft for a data collection plan. This section explains the main stages of a standard data collection project.

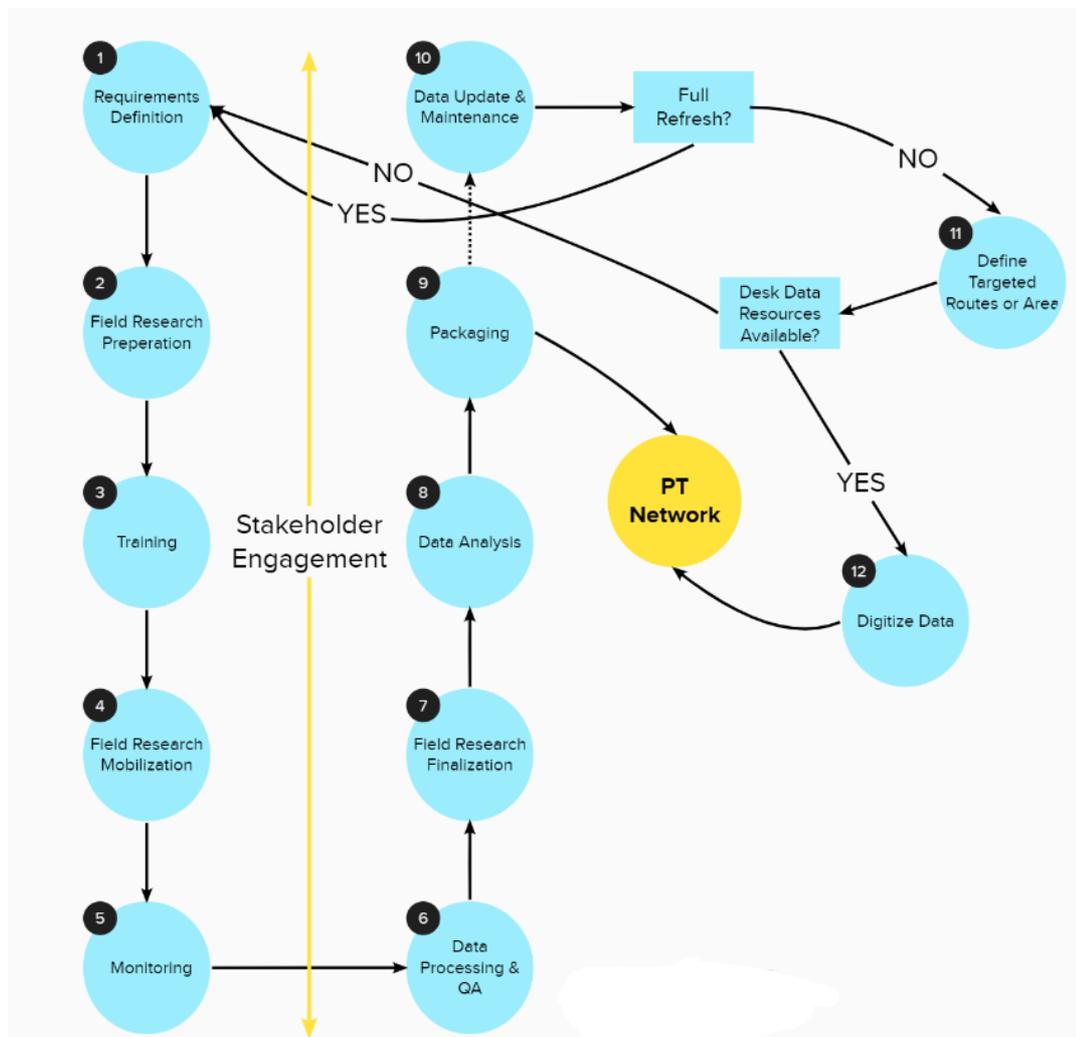


Figure 17 - Process for a standard data collection project

The plan usually starts with a “Requirements Definition”. This phase constitutes a breakdown of larger project objectives into specific data points (e.g., we want to capture passenger flow across main streets,



broken down into services itineraries, ridership, frequency, boarding and alighting locations). This phase is also when survey design and sample distribution should be executed.

The next phase is when we “Plan Field Research”. Now that we have clear goals for the project, we proceed to further define the scope of the field research: the timeline (start and end of project), team size, sample size for each survey, and the number of person-days needed.

Afterwards the “Training” should include, in addition to sessions and a curriculum, a Field Research Protocol. This document should be a field handbook that the Field Researchers can carry in their phones for reference on how to collect data and how to behave in different situations. The training sessions should also focus on the use of data collection tools and how to interact with the different apps and devices. Training should be followed directly by the “Field Research Mobilization”.

“Monitoring” the field research progress is the daily follow-up on both Field Research & Data KPIs. The difference between the two is that the former focuses on person-days spent against the estimated budget spending and daily attendance, while the latter focuses on the amount and quality of data received. Monitoring should also include any emergencies or exceptional circumstances happening in the field.

While field research is ongoing, “Data Processing & Quality Assurance” should be running in parallel. The main activity of a desk-based data specialist is to validate incoming surveys, as well as to communicate data-related feedback to the Field Research team (e.g., A route that was thought to start at a given market actually begins a couple of kilometers away at a popular street junction and so the terminal location should be shifted to accommodate this).

At the “Field Research Finalization” phase, these questions should be asked and addressed:

- Have the sample targets been met?
- Have the person-days been spent? Are we over or below budget?

A report at the end of field research is essential for documenting and communicating the process. The report would describe the purpose and the processes done during the data collection, as well as statistics and figures from the collected data.

5.1.1 Data Update & Maintenance

The more dynamic the city is, the quicker data grows old. Having up-to-date data in contexts with no automated tracking or ITS systems means field research should be either continuous or periodic based on need. In any case field research should be cheap, efficient, and targeted.

When approaching data update, there is one of two ways:

- **Full refresh:** A complete field research that maps the entire public transport network from scratch. This is usually done in the case of significant changes that would affect the whole network such as new licensing paradigms or heavy infrastructure changes across the city.
- **Focused:** An update to a specific list of routes, terminals, or areas (neighborhoods, districts, etc.).

In the latter case, we try to rely on secondary data, if available, to substitute field research. Secondary data can be digitized and incorporated into the Information System. Where data is scarce, a focused field research project is initiated, and the cycle is repeated. The scope of the field research is limited to our specific targets.

5.2 Software

5.2.1 Concept

Software tools used in data collection and management can drastically affect the overall sustainability of the Information System. In the Transport IS context, an optimal software tool should be characterized with the following:

- **Simple:** A friendly user interface with as much complexity hidden from the end-user as possible. This removes the learning curve overhead and welcomes users from different domains.



- **Focused:** Tailored to the context of transport data, this eliminates the need of workarounds using off-the-shelf generalized products.
- **Customizable:** While focused, the tool should still allow a level of customization to adapt to different project's needs. One example is allowing a customizable survey attachment to standard transport surveys.
- **Empowering** to users: Through providing them with the required datapoints, whether the actual surveys or field management performance indicators and measures of data accuracy.
- **Open:** Free and/or Open-source software. While proprietary software often may do the job, they tend to enclose the user within their single software suite making it harder to integrate with other systems.
- **Documented:** A strong documentation is key to enable independent implementation and use of the software without the need of relying on a third party.

Moreover, these characteristics should drive to the following objectives:

- **Better data quality**
- **Increased performance:** In the office and in the field
- **Independent implementation**
- **Reduced costs:** Due to performance increase but also cutting software licenses cost

5.2.2 Design

To materialize the concept, one should take a deeper dive into how the software system should look like. We look at

1. Features: What does the tool offer to the user?
2. Architecture: The overall structure of the tool and how it aligns to the concept

“Efficiency” comes hand in hand with “Data Quality”, both require proper “Data Management”, “Field Research “Monitoring” in real time and “Change Management” (dive into data complexity), this in turn prompts “Centralization”, hence cloud-based solutions.

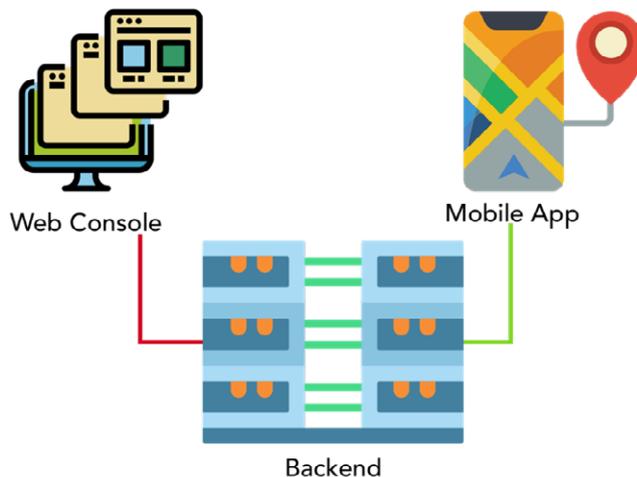


Figure 18 - Software and hardware components

5.3 Implementation Strategy



5.3.1 Political Will

The first step to ensure the continuous provision of resources for data collection is to convince decision makers of the importance of an up-to-date information system. This has to be demonstrated through periodic engagement with the identified stakeholders in the form of:

- Presentations of ongoing or work completed, highlighting the use of data
- Calculating return of investment in data collection. This can be very complicated or very simple, based on the approach. One example is the comparison of KPIs for selected data-related tasks such as route surveys or route planning, with and before the introduction of the information system
- Highlighting the different uses of datasets, whether in practice or as potential

One example from Addis Ababa in 2019, when the minister of transport introduced the first trip planning application open to the public, in a press conference attended by international news outlets. The app used the same data collected by the Addis Ababa transport authority for planning and licensing purposes.

5.3.2 Provision of Resources

Funding availability is necessary to ensure regular data update cycles. Funding can be secured by the public or private sector. Public sector funding necessitates lobbying for the importance of transit data in transport and city planning. Data, specifically when made open, can provide many economic benefits that outweigh the cost of collecting and maintaining the data¹.

Open data spurs business innovation, business creating, and business efficiency². Data availability makes it easier for private sector companies to build products and services on top of it. New business opportunities are also built on top of open data, creating economic value.

Some of these new innovations could also be useful for public sector planning. An example would be the UKRI³ funded ActDev⁴ project, which uses publicly available census data on commuting patterns to help support planning for walking and cycling.

Private sector funding can be obtained through licensing⁵ the data for non-commercial use. This could make data use by the private sector more restrictive, as the data cannot be used for commercial purposes except through agreements with the data provider. In such scenarios, the data could be sold to interested map and trip planning service providers. Examples of projects/companies that have acquired funding from such service providers include

- Digital Matatus
- Transport for Cairo
- Where Is My Transport

5.3.3 Dissemination

Showcasing the work done and its value is key to gaining support from existing and potential stakeholders. In that regard sharing of data and findings, when feasible, is a win-win to transport agencies. Other government sectors, development agencies and the private sector would gain from accessing the Information System.

5.3.4 Project Management

Data collection and management should be viewed as “projects”, in that each endeavor should have a clear scope, start and end, team responsibilities, budget and deliverables.

5.3.5 Innovation

Constant innovation is a must to ensure the sustainability of the proposed system. Adapting to a constantly changing environment is a challenge that needs to be addressed by dedicating resources to research & development.



Existing methodologies need to be put to the test all the time, and especially before taking on new projects. One approach is by conducting a “post-mortem” for each project after its finalized to see what went right, what went wrong and what can be improved.

Allowing room for innovation and showcasing it’s added value externally, contributes immensely to making the organization attractive for young professionals, bringing in new ideas and technologies to the table, and in turn creating a virtuous cycle that affects efficiency and the quality of the Information System.

5.4 Recommendations

Moving forward and beyond the scope of GUMAP, we recommend the following steps to ensure data sustainability.

5.4.1 Data Storage

Data must be extracted and kept on a version-controlled repository, a lot of free options are available including GitHub and GitLab, the latter, for example, being used by the DigitalTransport4Africa resource center to store and disseminate data⁶.

The advantage of such a data storage system is the ability to retrieve different versions of the datasets (if changes has been done) and the ability to share data across different organizations. It is also much simpler than a database management system software.

Database management software, while better suited to maintain large datasets, is not necessary for datasets of a small-to-medium scale such as data collected during GUMAP.

Repository hosting on GitHub and GitLab is completely free and there is the option of having access to be either public or private to specific users. However, a knowledge of “git” and version control is necessary to maintain the repository.

GAPTE would be the suitable candidate to provide the technical support in creating and maintaining this repository.

5.4.2 Presenting the Work

A dissemination event for the progress and findings of the data collection should be held by GAPTE and the DOTs, preferably right after the report publication. The attendees should be from both the public and the private sector and should span decision makers, urban planners, entrepreneurs, and local investors among others.

The event would act as a focal point for potential investment from the private and public sectors into the continuation of the data collection process. The main focus should be on the potential of having this dataset, it’s applications and the efficiency of data collection using technology.

5.4.3 Continuation of Data Collection

A core data collection and management team should be established by GAPTE, and resources shared by GAPTE and the different DOTs. This team would build on the work done.

Building on existing data collected during GUMAP, the team will conduct a 2-phase mapping project as follows:

Phase 1

All routes that were not mapped under the current assignment need to be identified and have onboard surveys done at least once for each, so that the team builds a comprehensive “index of routes” for the city. The steps to accomplish this are the following:

- Collecting Onboard Surveys once for each route that was identified but not mapped during GUMAP

⁶ <https://git.digitaltransport4africa.org/data/africa>



There were 110 mapped routes during GUMAP, and further 91 routes that were identified from terminals but were not included in the sample. These 91 routes would be mapped first.

How do we reach those 91 routes? Those are the identification surveys on RouteLab that has the status of “accepted” but have not been “converted to routes” yet. When we convert an accepted identification survey into a route, that means it becomes a new route included in our mapping sample. We would then be able to conduct onboard surveys for this newly created route with the RouteLab suite of tools.

- Identifying routes in terminals that weren’t visited under this activity:

After agreeing on the route sample during GUMAP, the field researchers came across previously undiscovered terminals (**Appendix A – Terminals without Identification Surveys**). These terminals would require:

- Confirmation from the relevant MMDA that those terminals exist: This would be a review process with overlaying the terminals over satellite imagery for reference
- Going to the terminals and conducting identification surveys for routes within them to include in the mapping process
- Validation and processing of incoming Onboard surveys should be done in parallel to the field research. This would be done using the “Snapper” software as was done during GUMAP.

By the end of “Phase 1” the team would have geographic traces of all the missing routes from GUMAP.

Phase 2

This phase would focus on collecting additional data for a prioritized list of routes, out of the newly mapped routes.

- Prioritize routes from list of newly mapped routes
- Collect additional onboard surveys, in addition to frequency surveys for routes with the highest priority
- Merge the new dataset with the existing one to get a comprehensive snapshot of the Greater Accra for 2021/2022

The team can use RouteLab for duration of the license and/or use other data collection apps that utilize smartphones GPS such as ODK, KoboCollect (both free and open source), or others.

As mentioned in 5.1.1 Data updates should be applied as follows:

- **Focused Data Collection:** It’s strongly recommended to construct a pipeline between GAPTE’s field research team and the planning and construction departments. This is to ensure an informed ‘targeted’ field research exercise to map affected areas
- **Biennial Full Refresh:** Once sufficient capacity will have been established at GAPTE and MMDA-level, a large data collection campaign should be organized every two years to carry out a full refresh. That entails starting the identification and route surveys from scratch.



6. Capacity Building Workshops

3 capacity building workshops were conducted during this project. The workshops were hosted online and were attended by representatives of the following offices:

- *GAPTE*
- *MLGDRD,*
- *Ablekuma Central Municipal Assembly*
- *Accra Metropolitan Assembly,*
- *Ashaiman Municipal Assembly*
- *Ga Central Municipal Assembly*
- *Ga East Municipal Assembly*
- *Ga South Municipal Assembly*
- *Ga West Municipal Assembly*
- *Madina Municipal Assembly*
- *Tema Metropolitan Assembly*

The workshop material was all documented and sent to the client as a future reference. This included presentations, excel files, guiding documents for RouteLab, and video recordings of all workshops. The workshops are summarized below:

6.1 Workshop 1: Field Research Strategy

- Data Collection Planning: How to estimate required field research capacity and come up with suitable time plans
- Field Research Workflow: An explanation of the data pipeline; how the data collected in the field is processed, how we measure KPIs and ensure sampling targets are met, and how feedback from the field is incorporated in the work.
 - Data Entities
 - Identifying Routes and Terminals
 - Conducting Onboard and Frequency Surveys
 - Processing/Validating Raw Data
 - Digitizing Stop Network
 - Estimating Headways
 - Creating GTFS feeds

6.2 Workshop 2: Field Research Mobilisation

- Software Tools (an explanation of each tool and its role in the project)
- Field Research Guidelines
 - General Guidelines
 - Survey-specific guidelines
 - Covid-19 guidelines



6.3 Workshop 3: Data Processing and Management

- Data Management: Overview of the format(s) in which spatial data is stored and how it is imported it into an open-source GIS platform (QGIS)
- Data Exploration / Analysis: Exploring datasets using QGIS.
 - Layer styling for data exploration / visualization
 - Summary statistics
 - Spatial operations (joins, buffers, intersections)
- OpenStreetMap: Brief overview of OpenStreetMap, the most comprehensive open-source map of the world.
 - Downloading data from OSM
 - Editing the map



7. References

1. Houghton, J. *Costs and Benefits of Data Provision*. (2011).
2. Open data and economic growth: which link, if any? *Open Government Partnership*
<https://www.opengovpartnership.org/stories/open-data-and-economic-growth-which-link-if-any/>
(2012).
3. UK Research and Innovation. <https://www.ukri.org/>.
4. ActDev - Active travel provision and potential in planned and proposed development sites.
<https://actdev.cyipt.bike/>.
5. Creative Commons — Attribution-NonCommercial 2.0 Generic — CC BY-NC 2.0.
<https://creativecommons.org/licenses/by-nc/2.0/>.





Appendix A – Terminals without Identification Surveys

#	Name	MMDA Name
1	Berekuso Taxi Rank	Akwapem South
2	Akropong	Akwapem North
3	American house Bus Terminal	Adenta Municipal
4	Kasoa	Awutu Senya East
5	Korle Bu Station	Ablekuma West Municipal
6	Bubuashie Station	Ablekuma North Municipal
7	Odorkor Station	Ablekuma North Municipal
8	Shiashie Station	Ayawaso West
9	UPS	Ayawaso West
10	Ofankour Barrier	Ga North Municipal
11	Seven Days Junction - Ofankor	Ga North Municipal
12	Accra Cantoments	La Dade-Kotopon
13	La Olympia Station	La Dade-Kotopon
14	Tetteh Quarshie Station (Accra Mall - Spintex)	La Dade-Kotopon
15	Nungua Bus Station	Krowor Municipal
16	Tsui Bleoo	Ledzokuku Municipal
17	Dodowa	Shai Osudoku
18	Sakumono	Tema West Municipal
19	Sowutuom - Lapaz (Lapaz Tema)	Okaikwei North Municipal
20	Ashalaja Station	Ga South Municipal
21	Dar-es-Salaam Last Stop	Weija Gbawe Municipal
22	Mallam Station	Weija Gbawe Municipal
23	Glefe	Weija Gbawe Municipal
24	Mallam Junction	Weija Gbawe Municipal
25	Agbogba	Ga East





26	Palace town Station	Ga Central Municipal
27	Auntie Aku	Ga Central Municipal
28	Paradise	Ga Central Municipal
29	Pantang Hospital Junction	La-Nkwantanang-Madina
30	Soko	Ablekuma Central Municipal
31	Sukura	Ablekuma Central Municipal
32	Russia Total Station (Loso Park)	Ablekuma Central Municipal
33	Papase	Ga West Municipal
34	Golden Door Last Stop	Ga West Municipal
35	Asofan	Ga West Municipal
36	Obeyeyie Taxi Station	Ga West Municipal
37	Asofan Old Station	Ga West Municipal
38	Omanjor station	Ga West Municipal



Appendix B – Summary of collected data by MMA



Appendix B : Scope of Work & Results

The project scope covers the Greater Accra Region and a **sample of approximately 110 routes** of trotro and shared taxi.

The temporal conventions used in the profiles are:

- The morning peak period (MPP) corresponding to the time interval from 6:00 am to 10:00 am
- The evening peak period (EPP) corresponding to the time interval from 3:00 pm to 7:00 pm
- The off-peak period corresponding to the time interval from 10:00 am to 3:00 pm

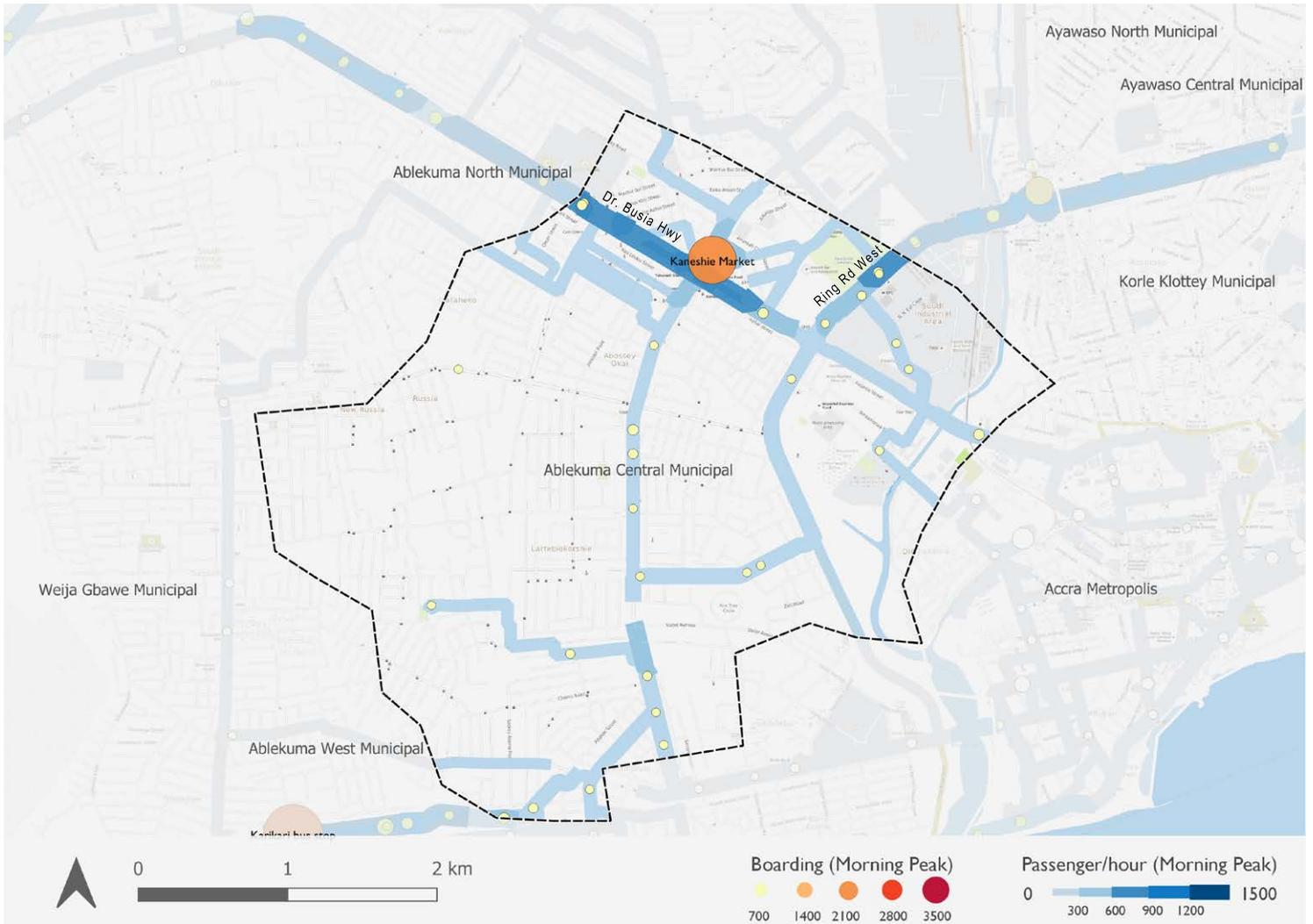
The MMDA profiles includes the following maps and information:

- A map with the number of boarding at stops and the number of passengers per hour along the routes during the MPP
- A histogram with the number of departures per route and per time period (if there is one or more terminals in the MMDA for the surveyed routes)
- A map with the vehicle speed during the MPP
- A summary table with the following data per route departing from the MMDA (*note that the name of trotro routes are marked with **blue color** and the one of shared taxi routes with **red color***) :
 - Departures per day
 - Length
 - Average stops per km
 - Average speed during peak periods
 - Average speed off-peak
 - Average travel time (all survey periods, rounded to the nearest 5 minutes)
 - Headway during peak periods
 - Daily pax served
 - Fare
- A short analysis
- A map with the average headway (in minutes) during the morning peak period

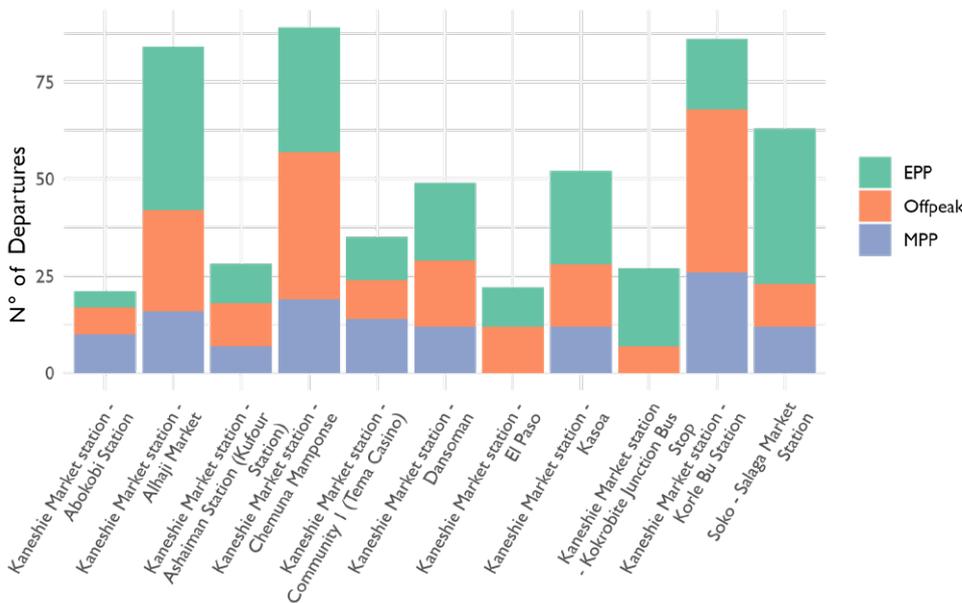
To note that:

- The Ada East and West Assemblies were not included in the project scope and therefore no data is presented for these two MMDA which will have to be surveyed as part of new study
- Four routes extend outside Greater Accra to Kasoa (Awutu Senya East Municipal Assembly) and Akropong (Akuapem North Municipal Assembly) and therefore have not been presented

Ablekuma Central Municipal Assembly (1/4)

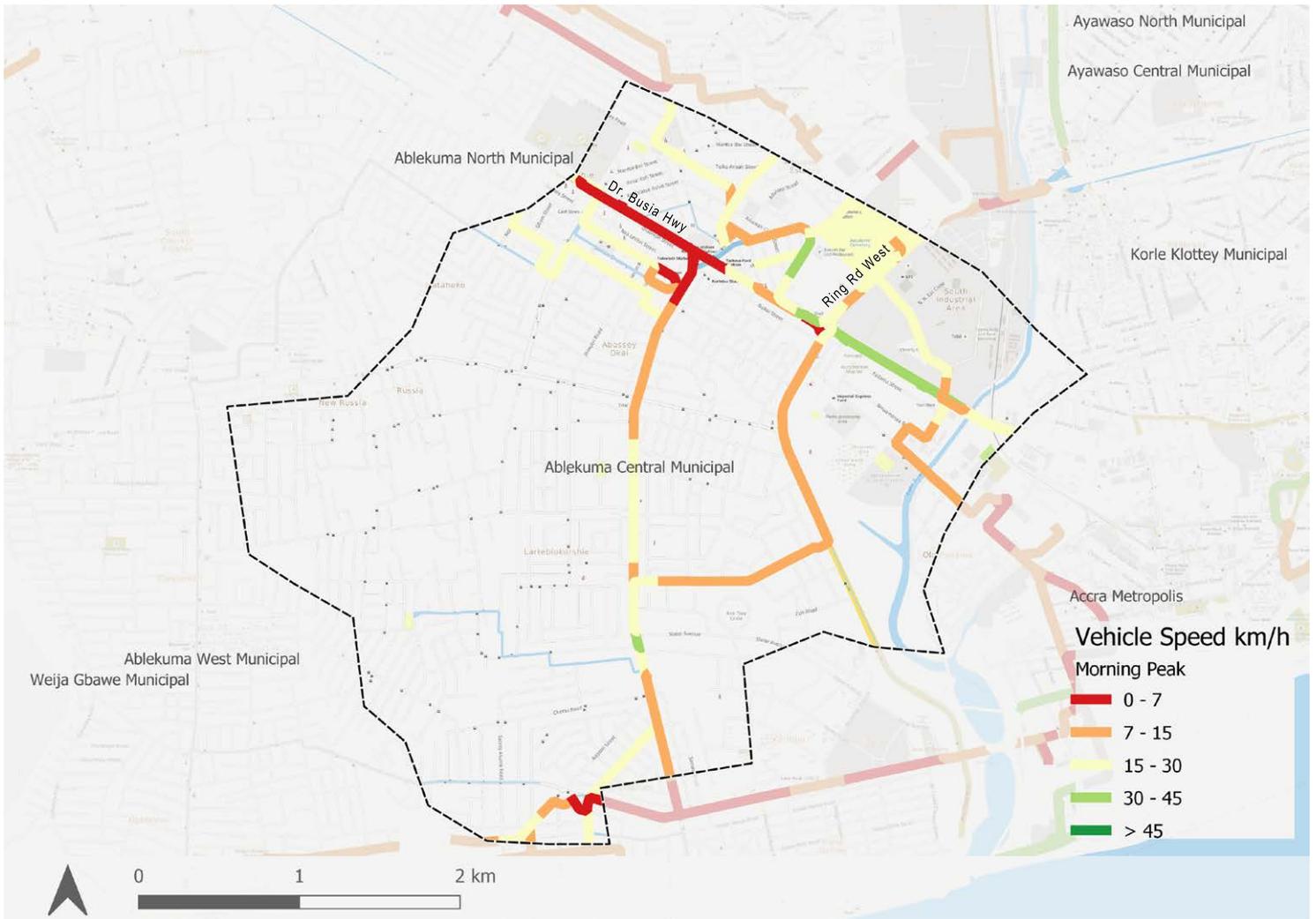


Ablekuma Central Municipal



- 11 surveyed routes departing from the Assembly
- 5 surveyed routes with more than 50 daily departures
- One main terminal: Kaneshie Market with about 2'100 boarding during MPP
- Good distribution of stops along the surveyed routes
- Overall homogeneous passenger flows along the surveyed routes (up to 300 pax/hour during MPP) with a greater concentration along the axes Dr. Busia Hwy (strong congestion during PP) and Ring Rd West

Ablekuma Central Municipal Assembly (2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Kaneshie Market station - Abokobi Station	27	31,9	0,7	12,7	15,8	2:15	42	567	6
Kaneshie Market station - Alhaji Market	86	9,3	1,2	11,4	13,5	0:45	10	604	2
Kaneshie Market station - Ashaiman Station (Kufour Station)	63	33,1	0,2	28,6	19,7	1:25	29	717	8
Kaneshie Market station - Chemuna Mamponse	49	5,5	1,1	13,3	11,3	0:25	10	148	2

Ablekuma Central Municipal Assembly

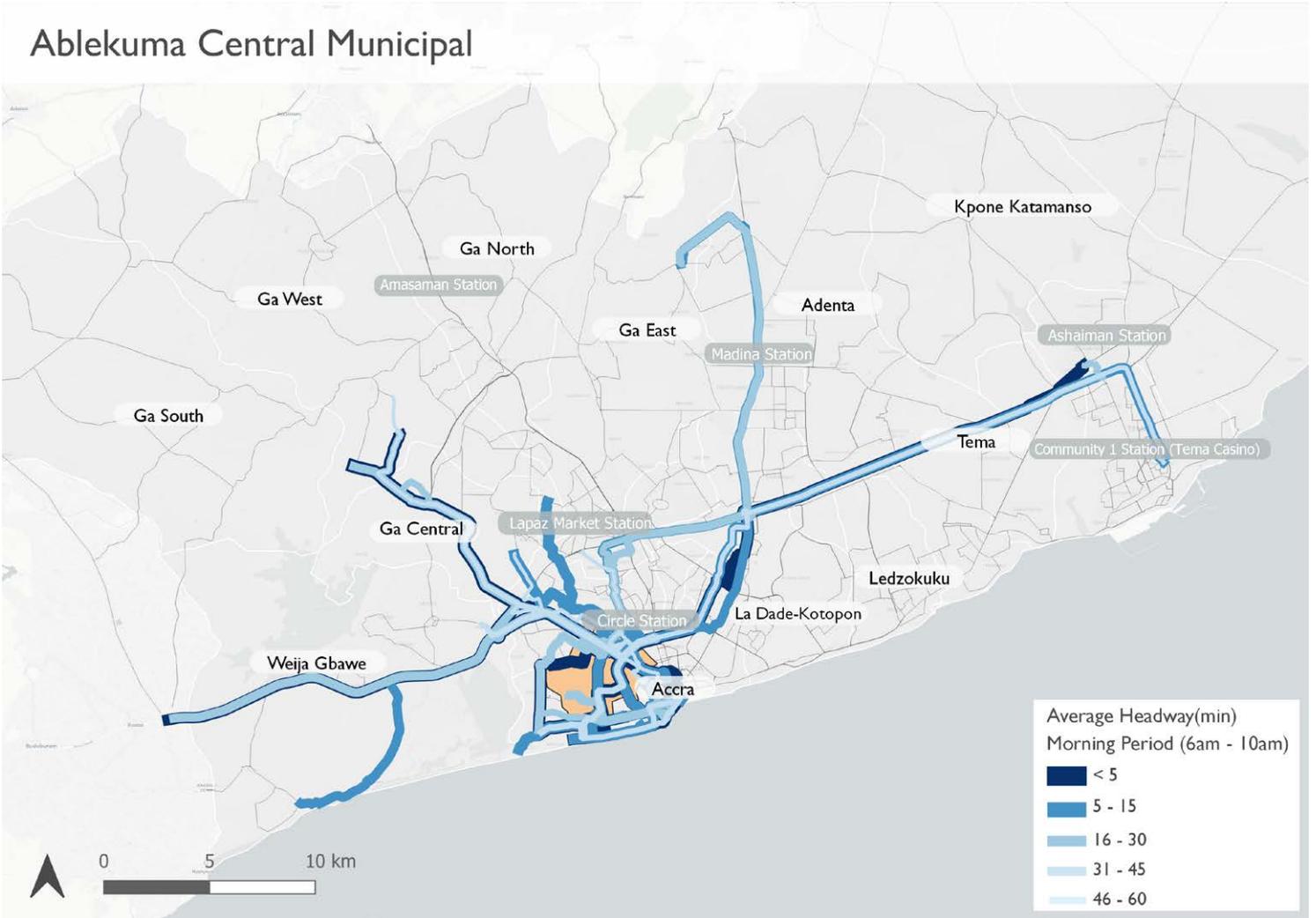
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Kaneshie Market station - Community 1 (Tema Casino)	35	37	0,2	24,7	24,5	1:35	19	895	10
Kaneshie Market station - Dansoman	21	8,2	0,4	11,1	13,4	0:40	16	399	4
Kaneshie Market station - El Paso	84	37,4	0,2	26	NA	1:30	25	1350	8
Kaneshie Market station - Kasoa	28	23,1	0,3	29,2	21,5	1:05	15	650	4
Kaneshie Market station - Kokrobite Junction Bus Stop	52	21,5	0,3	17,3	NA	1:10	12	576	5
Kaneshie Market station - Korle Bu Station	22	4,6	0,7	12,4	16	0:20	11	484	3
Soko - Salaga Market Station	89	6,7	1,2	13,4	9,5	0:35	13	1252	2

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

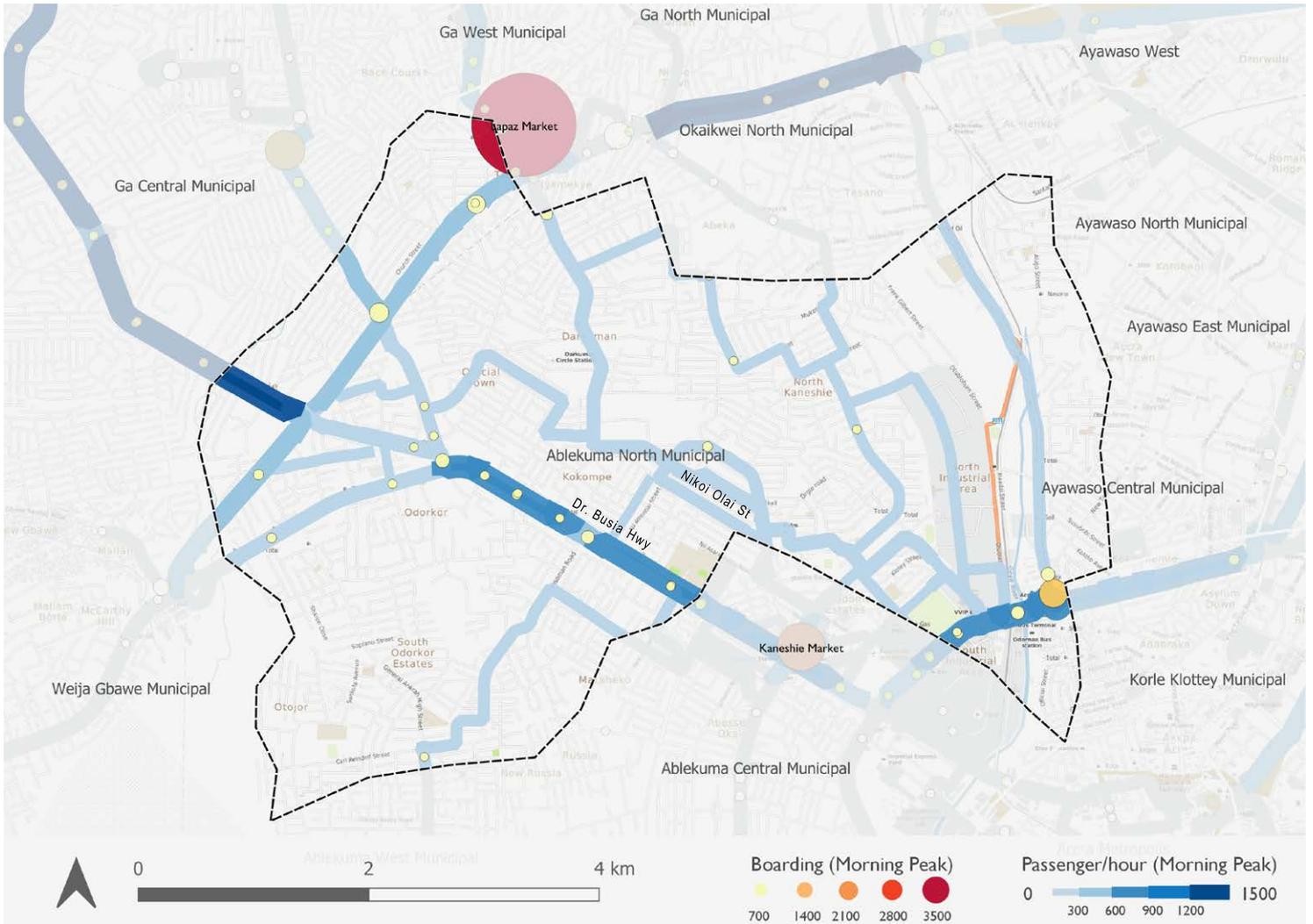
Ablekuma Central Municipal Assembly

(4/4)

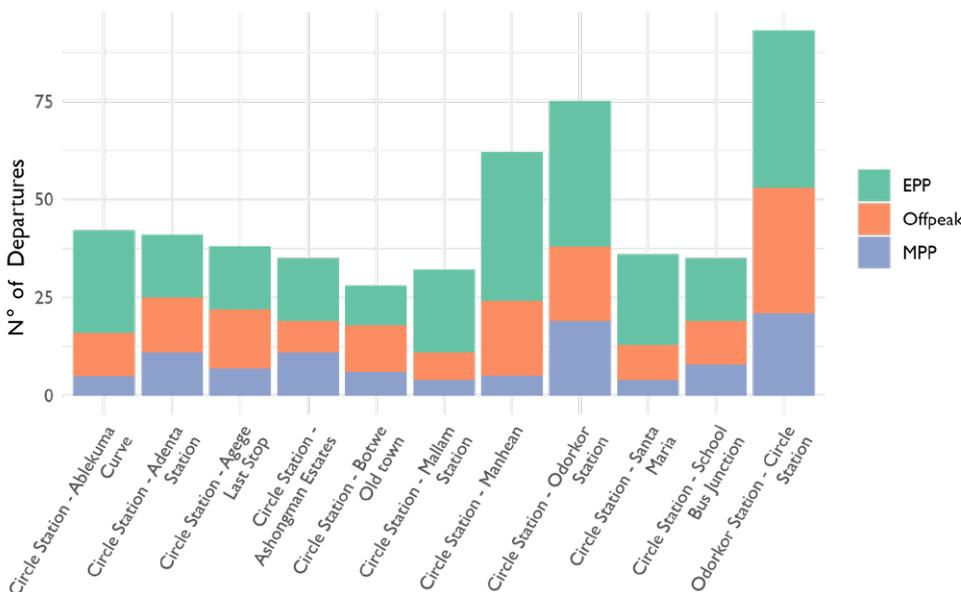


Ablekuma North Municipal Assembly

(1/4)



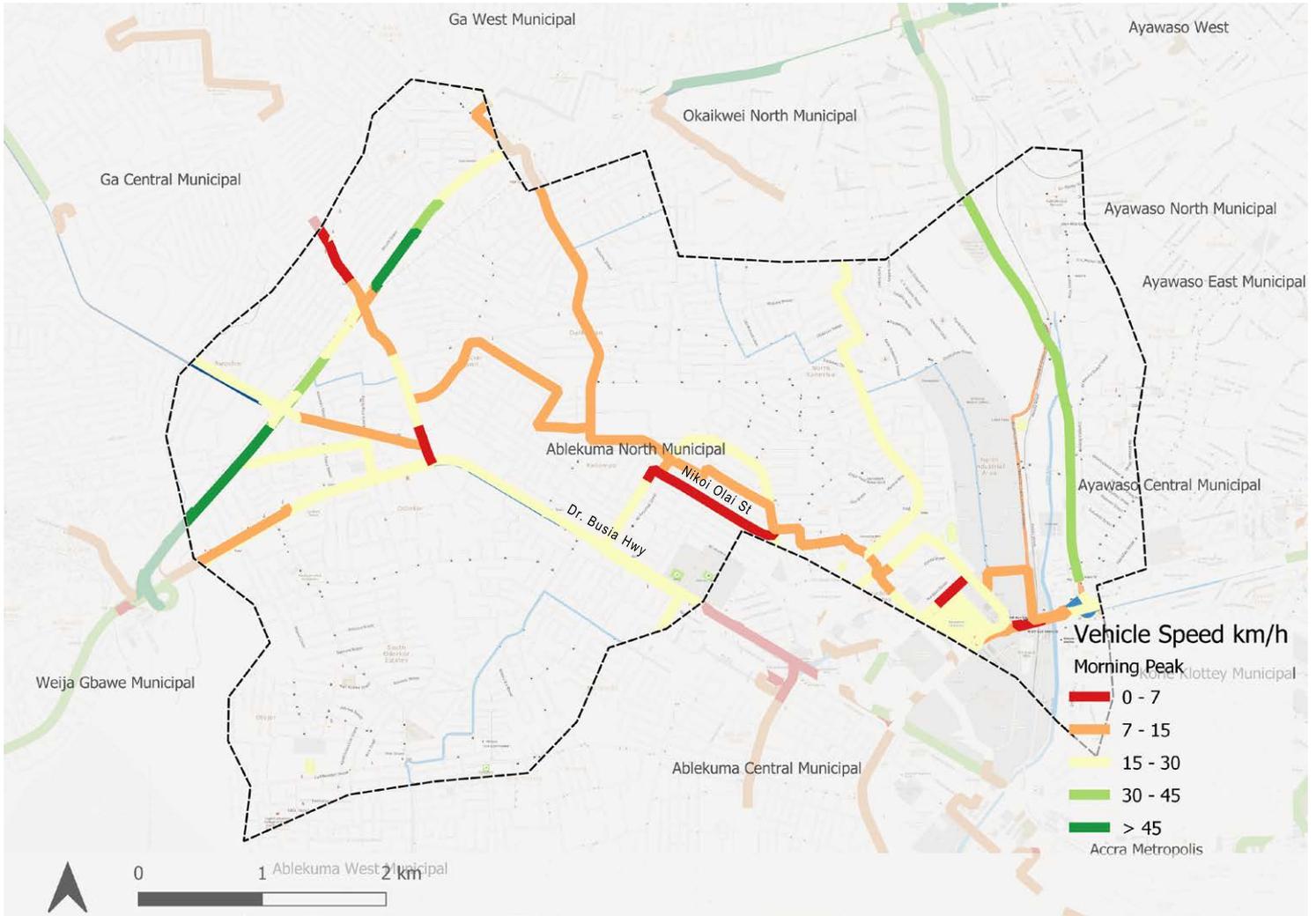
Ablekuma North Municipal



- 11 surveyed routes departing from the Assembly
- 3 main surveyed routes with more than 50 daily departures
- Overall homogeneous passenger flows along the surveyed routes (up to 300 pax/hour during MPP) with a greater concentration along Dr. Busia Hwy (up to 900 pax/hour)
- Stops clustered along Dr. Busia Hwy: little possibility for passengers wishing to board in North Kaneshie, Abeka Darkuman districts
- Strong congestion along Nikoi Olai St (north from Dr. Busia Hwy)

Ablekuma North Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Circle Station - Ablekuma Curve	41	14,6	0,5	11,95	12,6	1:10	30	912	4
Circle Station - Adenta Station	42	19,3	0,5	11,9	15,6	1:25	18	887	4
Circle Station - Agege Last Stop	93	8,7	0,7	13,9	12,1	0:40	26	1382	3
Circle Station - Ashongman Estates	10	17	0,5	18,3	18,2	0:55	18	196	6
Circle Station - Botwe Old town	52	21,5	0,7	10,1	12,9	1:55	33	630	4
Circle Station - Mallam Station	35	10,2	0,4	10,3	NA	1:00	36	613	3

Ablekuma North Municipal Assembly

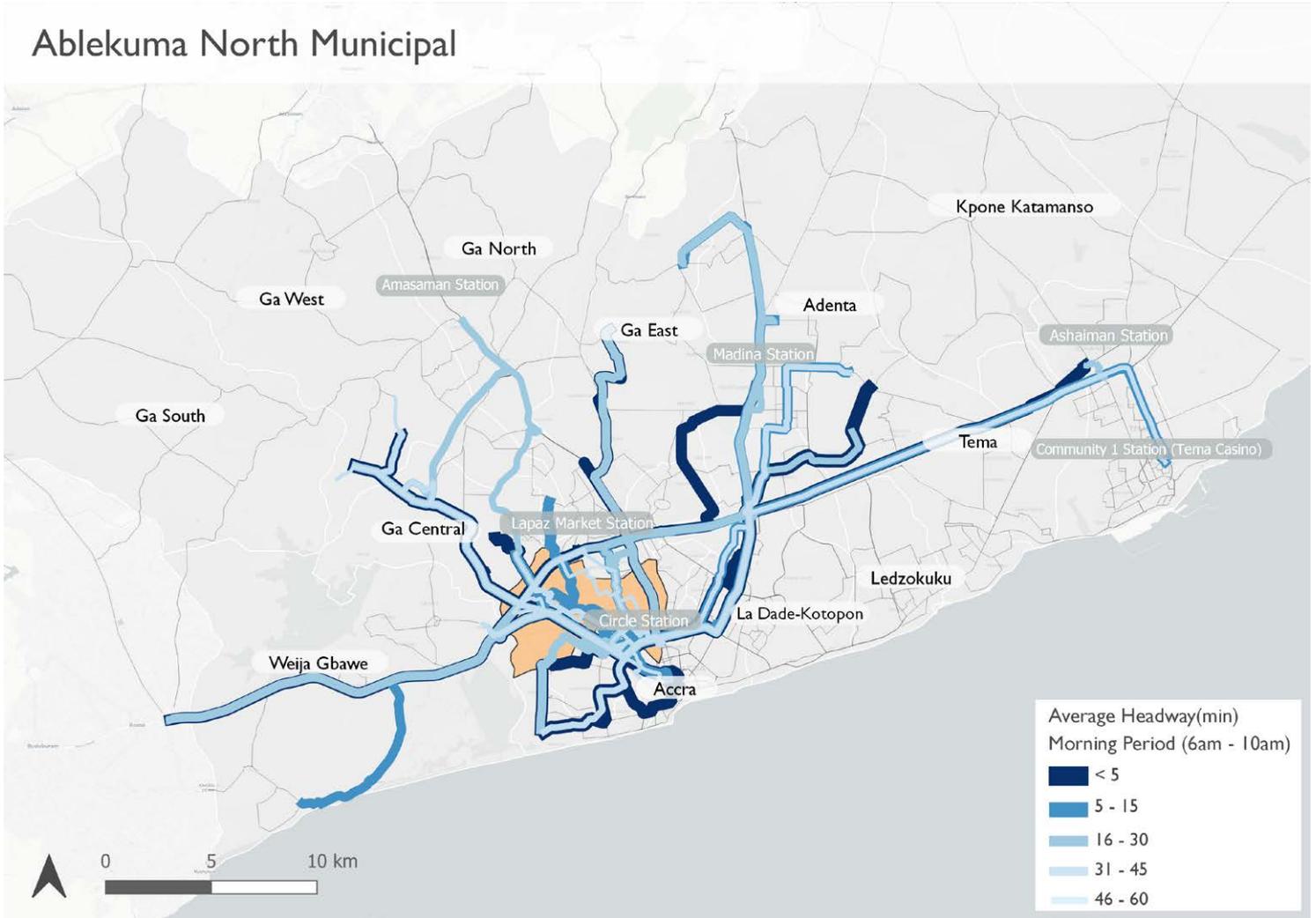
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Circle Station - Manhean	32	21,2	0,4	15,7	17	1:15	30	581	12
Circle Station - Odorkor Station	28	6,5	0,8	10,9	12,7	0:35	9	470	2
Circle Station - Santa Maria	38	11,9	0,4	10,5	11,8	1:05	35	536	3
Circle Station - School Bus Junction	35	18,2	0,9	12,6	NA	1:25	23	280	5
Odorkor Station - Circle Station	75	6,7	0,9	14,6	9,8	0:30	9	1123	2

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

Ablekuma North Municipal Assembly

(4/4)

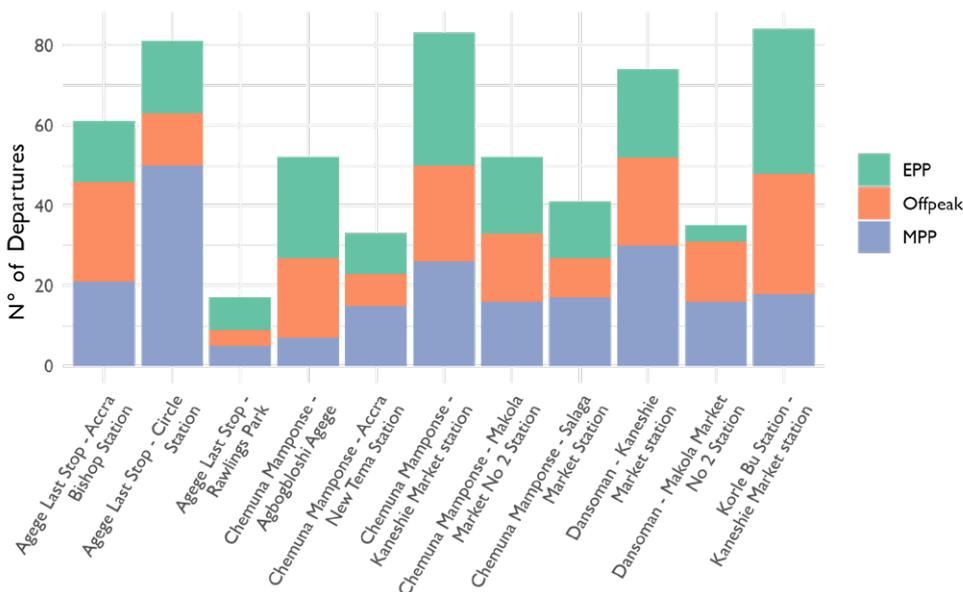


Ablekuma West Municipal Assembly

(1/4)



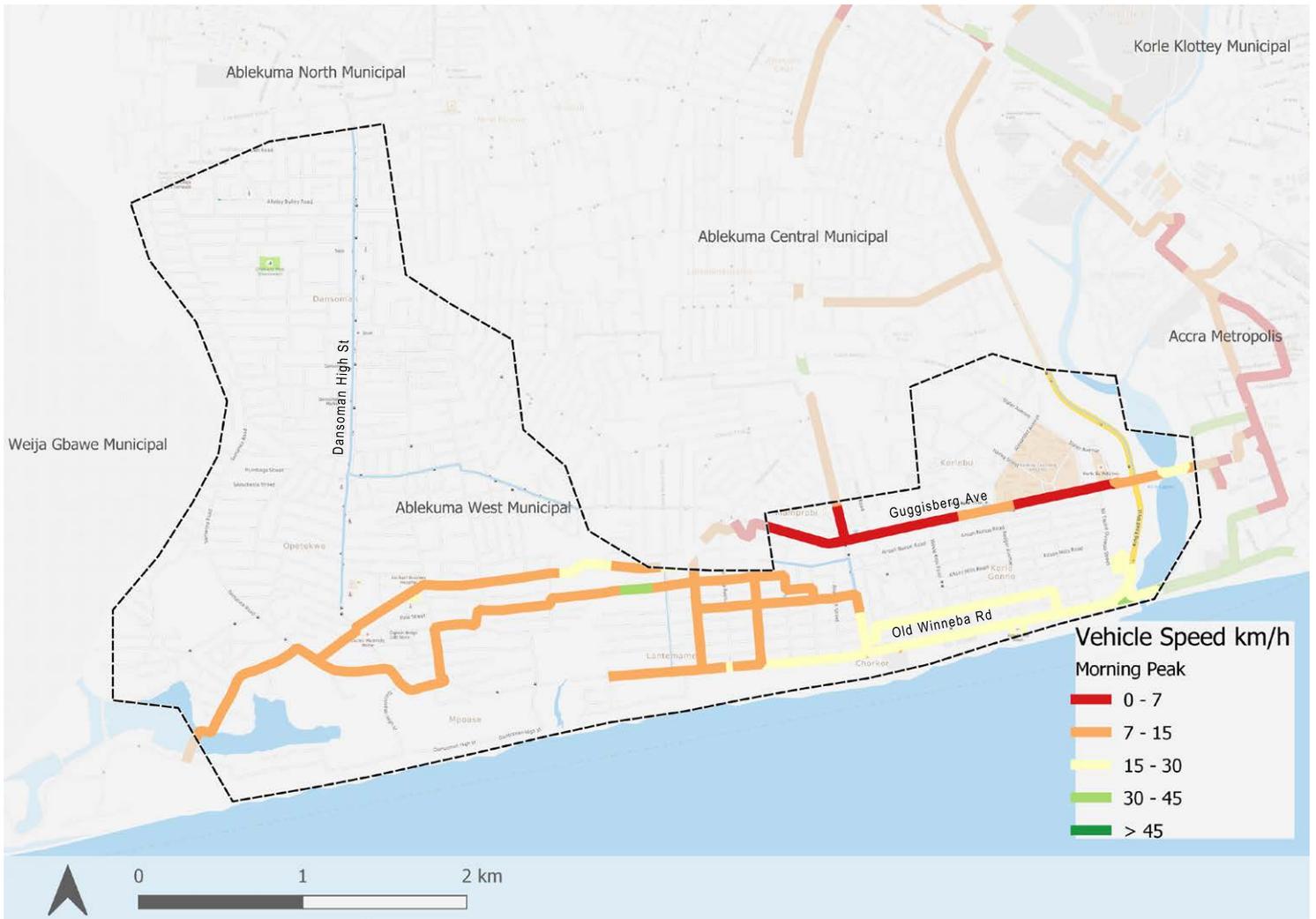
Ablekuma West Municipal



- 11 surveyed routes departing from the Assembly
- 7 surveyed routes with more than 50 daily departures
- One main stop: Karikura bus stop with about 2'100 boarding during MPP
- Overall homogeneous passenger flows along the surveyed routes with a greater concentration along the axe Guggisberg Ave (strong congestion during MPP on the eastern part)
- Good stops distribution along the routes with a greater concentration along Old Winneba Rd (up to 700 boarding per stop during MPP)

Ablekuma West Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Agege Last Stop - Accra Bishop Station	33	8,1	1,1	16,7	13	0:35	14	522	2
Agege Last Stop - Circle Station	83	9,2	0,5	12,5	NA	0:45	9	1085	3
Agege Last Stop - Rawlings Park	84	8,4	0,5	NA	16,9	0:30	37	336	6
Chemuna Mamponse - Agbogbloshi Agege	17	6,7	0,6	13,3	8,1	0:45	22	40	2
Chemuna Mamponse - Accra New Tema Station	52	6	1,0	15,2	NA	0:20	21	641	2

Ablekuma West Municipal Assembly

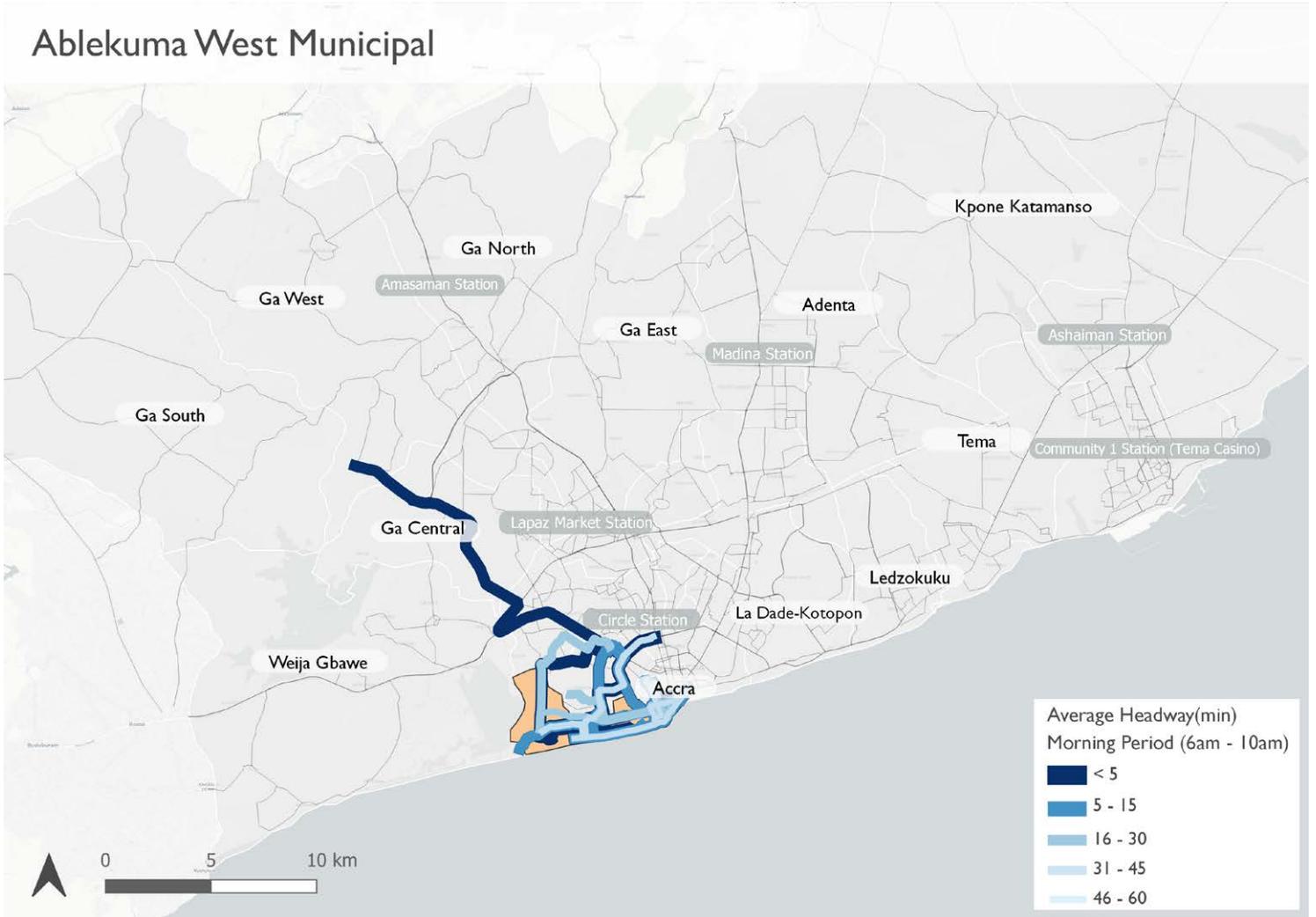
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [₦]
Chemuna Mamponse - Kaneshie Market station	61	5,4	1,3	11,2	11,2	0:30	8	1233	2
Chemuna Mamponse - Makola Market No 2 Station	52	6,8	0,9	11,5	13,3	0:35	14	654	2
Chemuna Mamponse - Salaga Market Station	35	5,4	0,6	23,8	13,8	0:20	16	775	3
Dansoman - Kaneshie Market station	41	7,1	0,6	13,3	18,6	0:25	9	152	4
Dansoman - Makola Market No 2 Station	81	7,6	0,9	10,4	NA	0:40	38	1562	3
Korle Bu Station - Kaneshie Market station	74	5,6	0,4	16,5	20,2	0:20	10	230	3

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

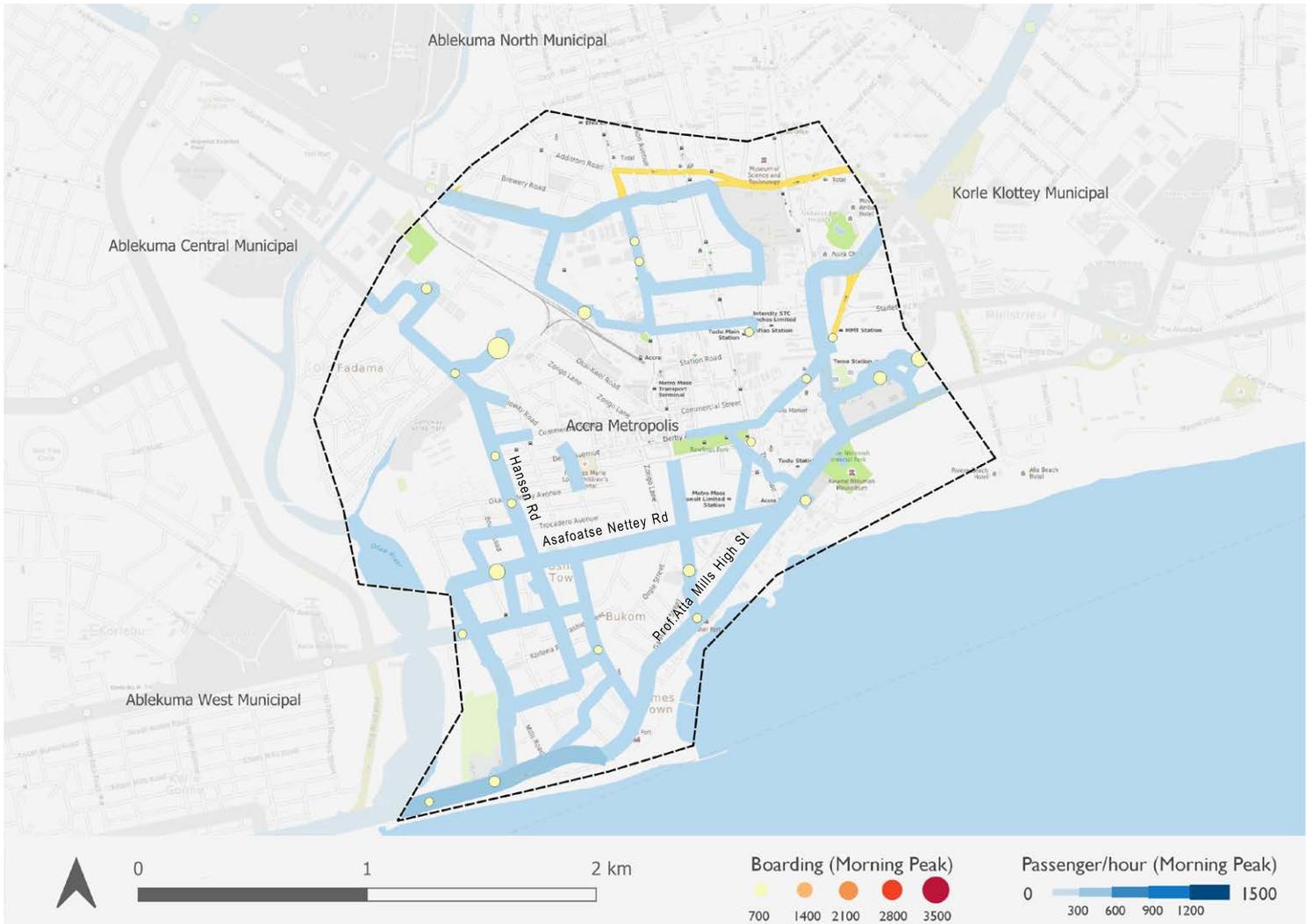
Ablekuma West Municipal Assembly

(4/4)

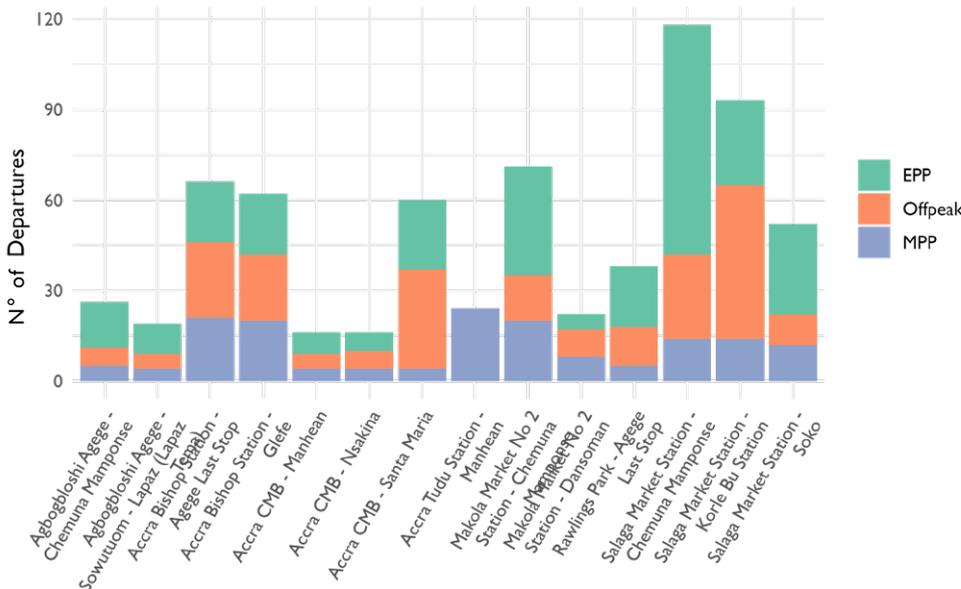


Accra Metropolitan Assembly

(1/4)



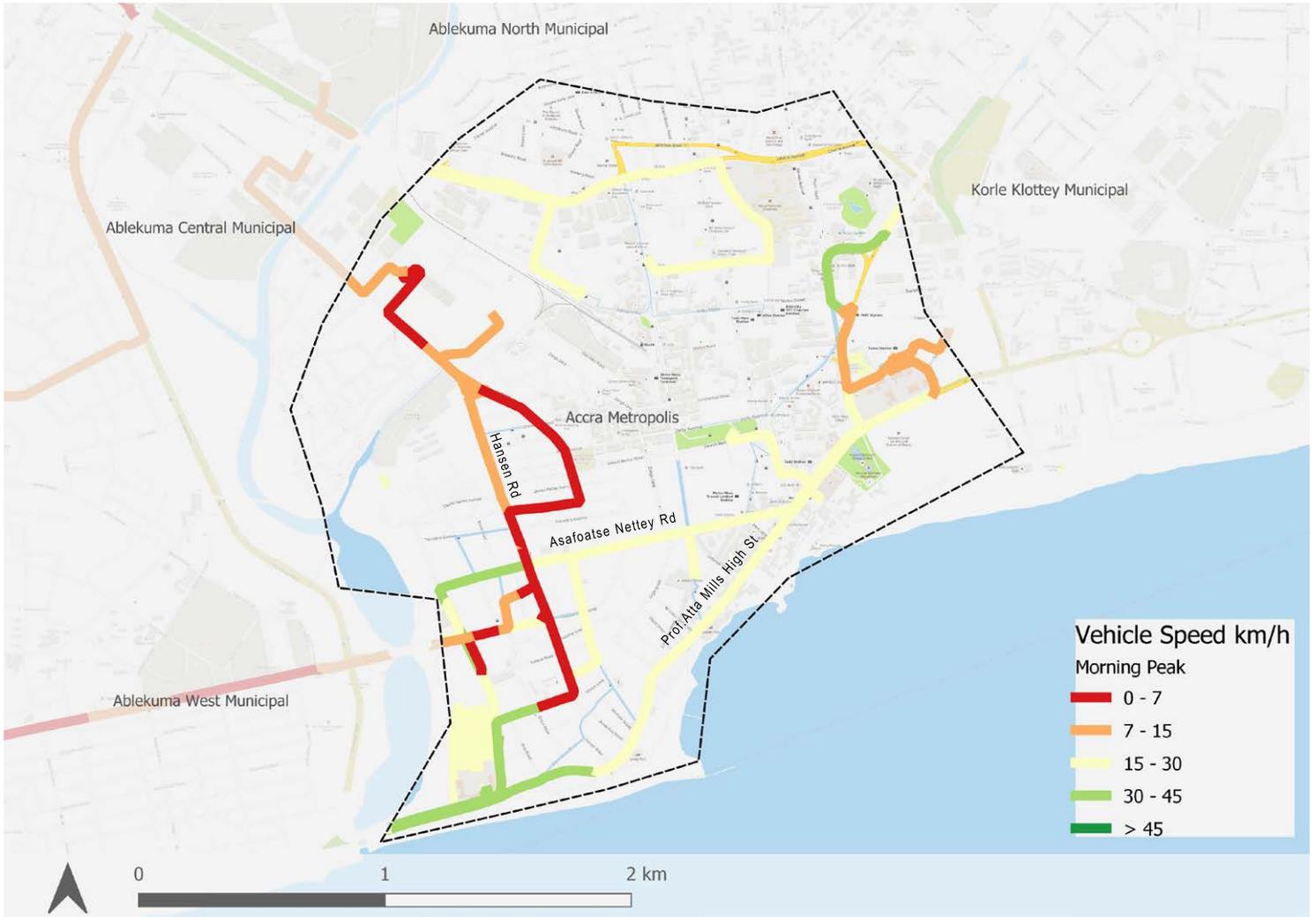
Accra Metropolis



- 14 surveyed routes departing from the Assembly
- 7 surveyed routes with more than 50 daily departures
- Overall homogeneous passenger flows along the surveyed routes (up to 300 pax/hour during MPP)
- Surveyed routes form a good network within the Assembly (good territorial coverage)
- Few stops along the routes with up to 700 boarding during MPP
- Strong congestion during PP on Hansen Rd

Accra Metropolitan Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
■ Trotro ■ Shared taxi Agbogbloshi Agege - Chemuna Mamponse	38	6,3	1,3	4,3	7,9	1:10	31	77	2
Agbogbloshi Agege - Sowutuom - Lapaz (Lapaz Tema)	22	9,3	0,8	3,4	7,6	1:55	43	212	3
Accra Bishop Station - Agege Last Stop	26	9,4	0,5	12,7	16,3	0:40	12	448	2
Accra Bishop Station - Glefe	52	10,7	0,7	15,9	NA	0:45	12	760	3

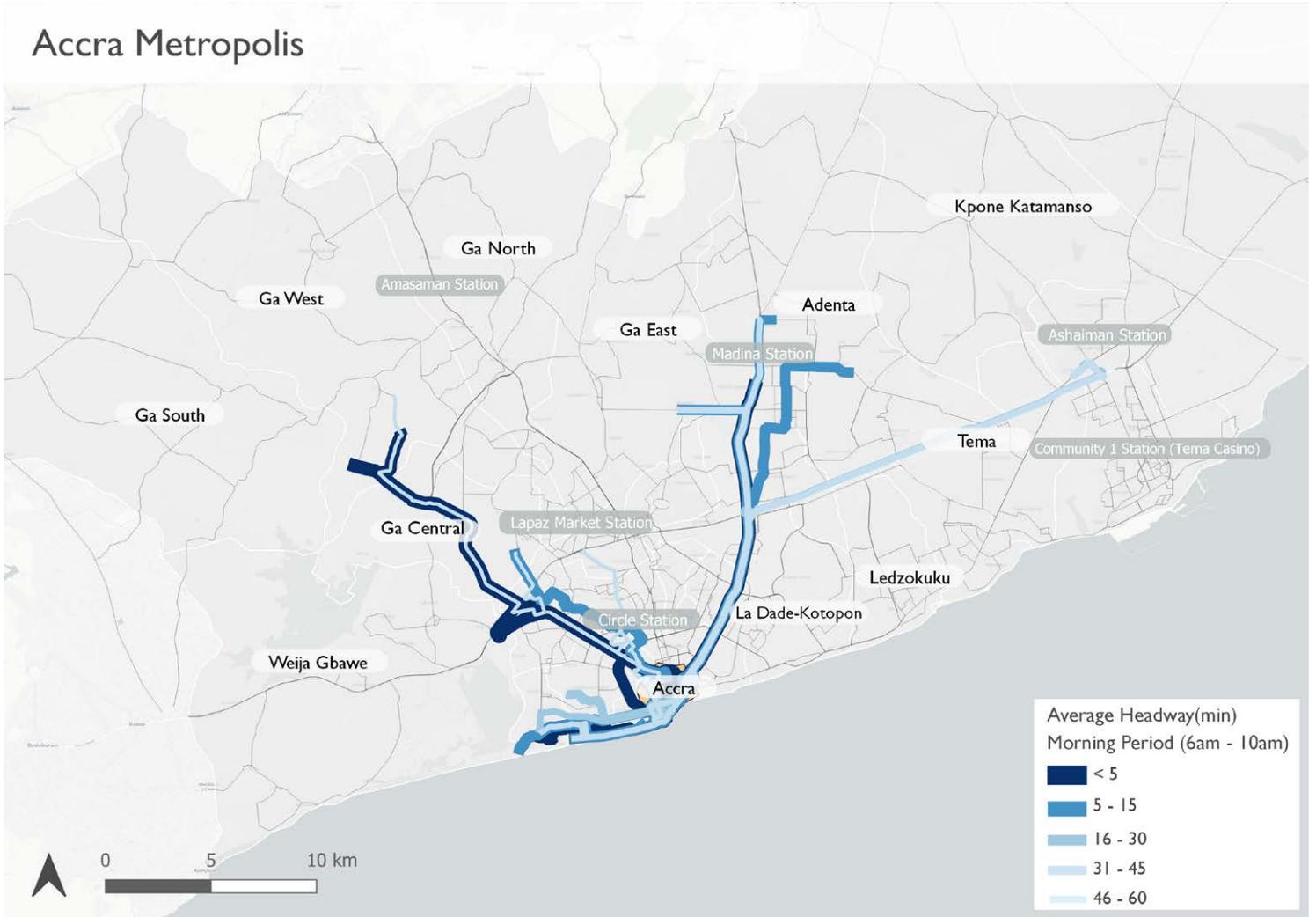
Accra Metropolitan Assembly

(3/4)

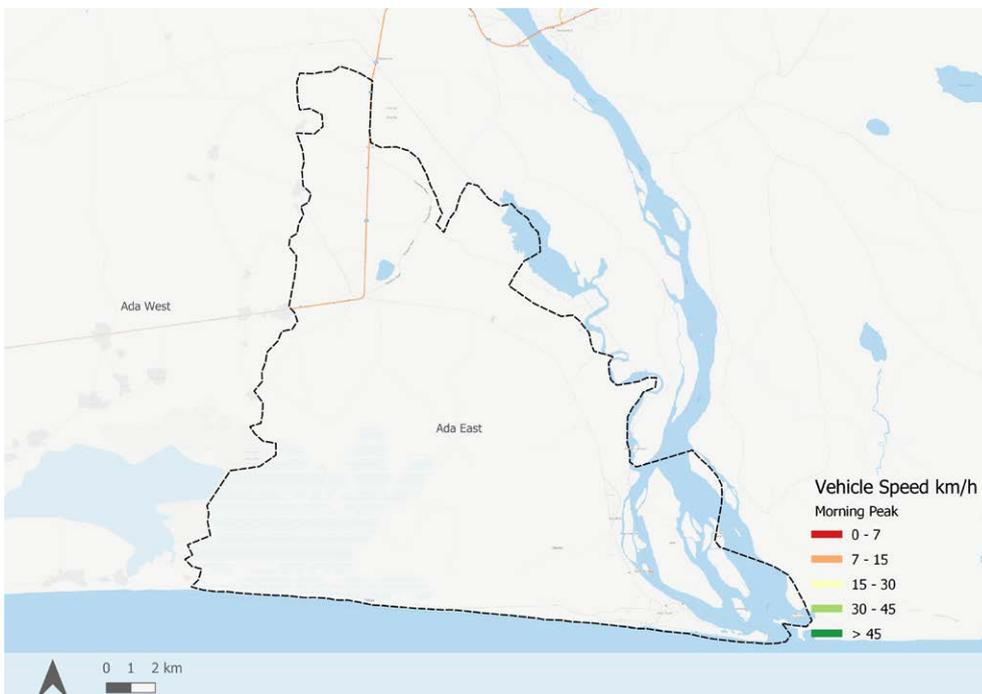
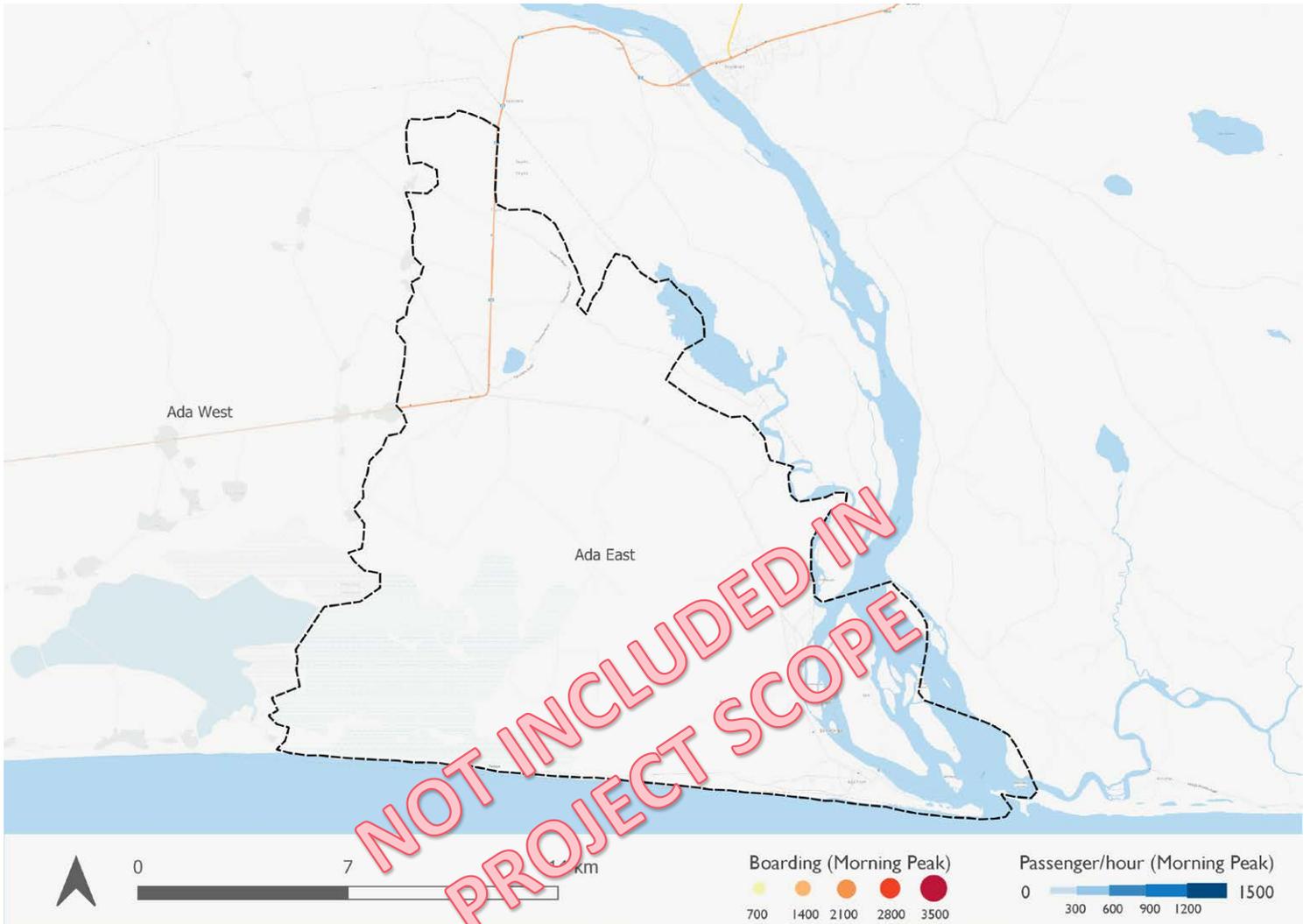
Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Accra CMB - Manhean	19	23,8	0,5	15,8	12	1:45	48	281	5
Accra CMB - Nsakina	60	22	0,4	11,2	NA	1:45	49	1248	5
Accra CMB - Santa Maria	16	10,9	0,4	13,6	10,1	0:55	35	342	3
Accra Tudu Station - Manhean	71	25	0,4	30,3	19,6	1:05	10	1182	5
Makola Market No 2 Station - Chemuna Mamponse	118	8,6	0,9	13,6	10,9	0:40	9	976	2
Makola Market No 2 Station - Dansoman	93	8,6	0,2	NA	5,2	1:40	38	1218	3
Rawlings Park - Agege Last Stop	62	9,2	0,4	11,1	12,8	0:45	29	1118	5
Salaga Market Station - Chemuna Mamponse	24	5,9	0,7	18,0	15,5	0:20	10	0	3
Salaga Market Station - Korle Bu Station	16	3	1,3	9,2	NA	0:15	13	378	2
Salaga Market Station - Soko	66	6,5	0,8	10,4	13,2	0:35	14	1239	2

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

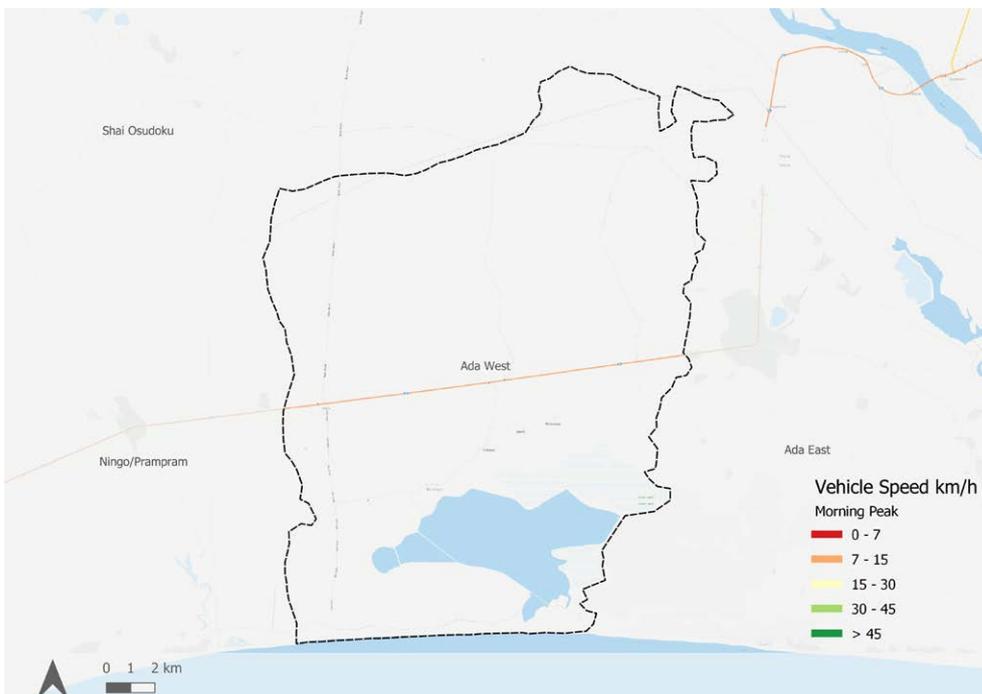
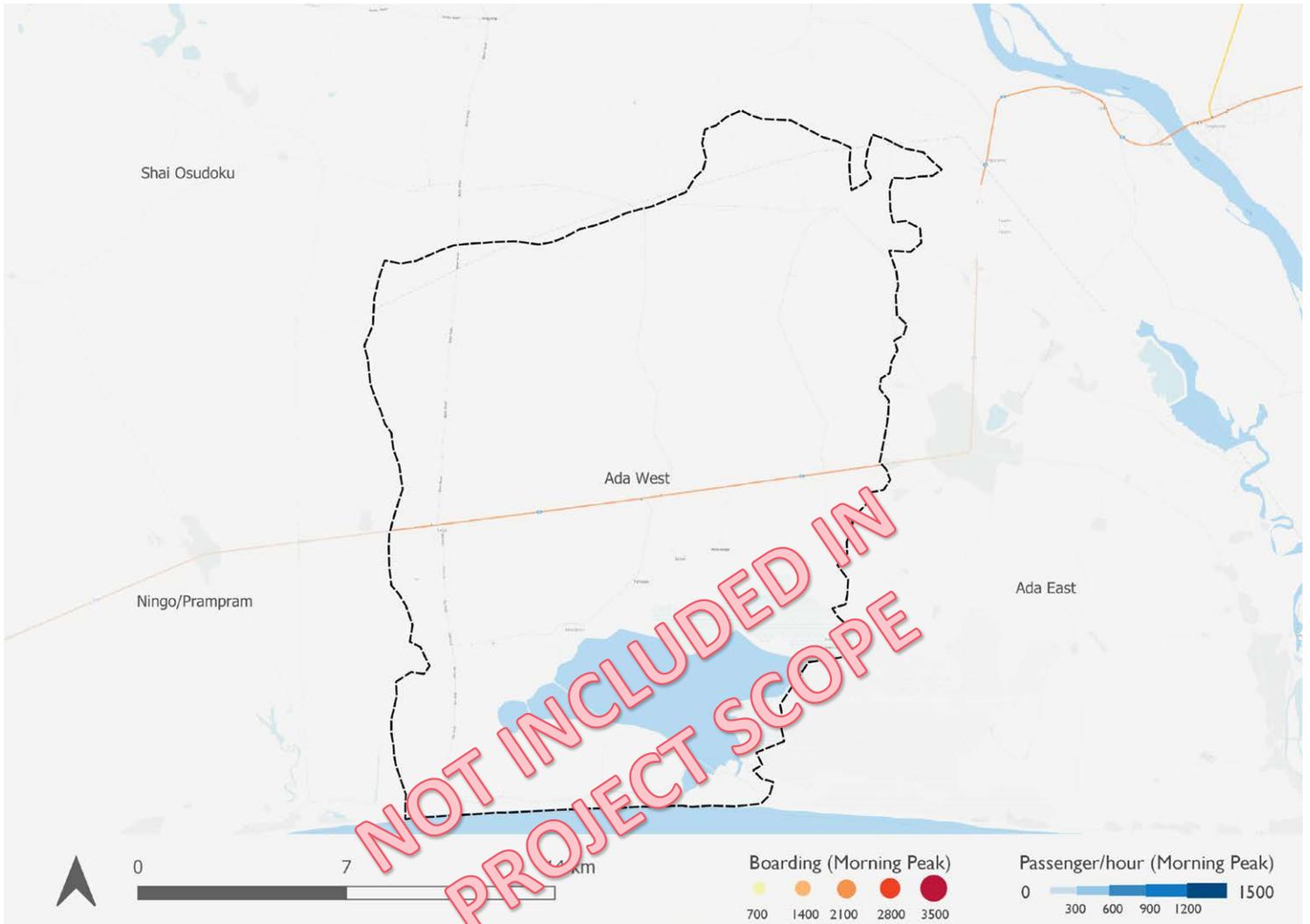
Accra Metropolitan Assembly



Ada East District Assembly

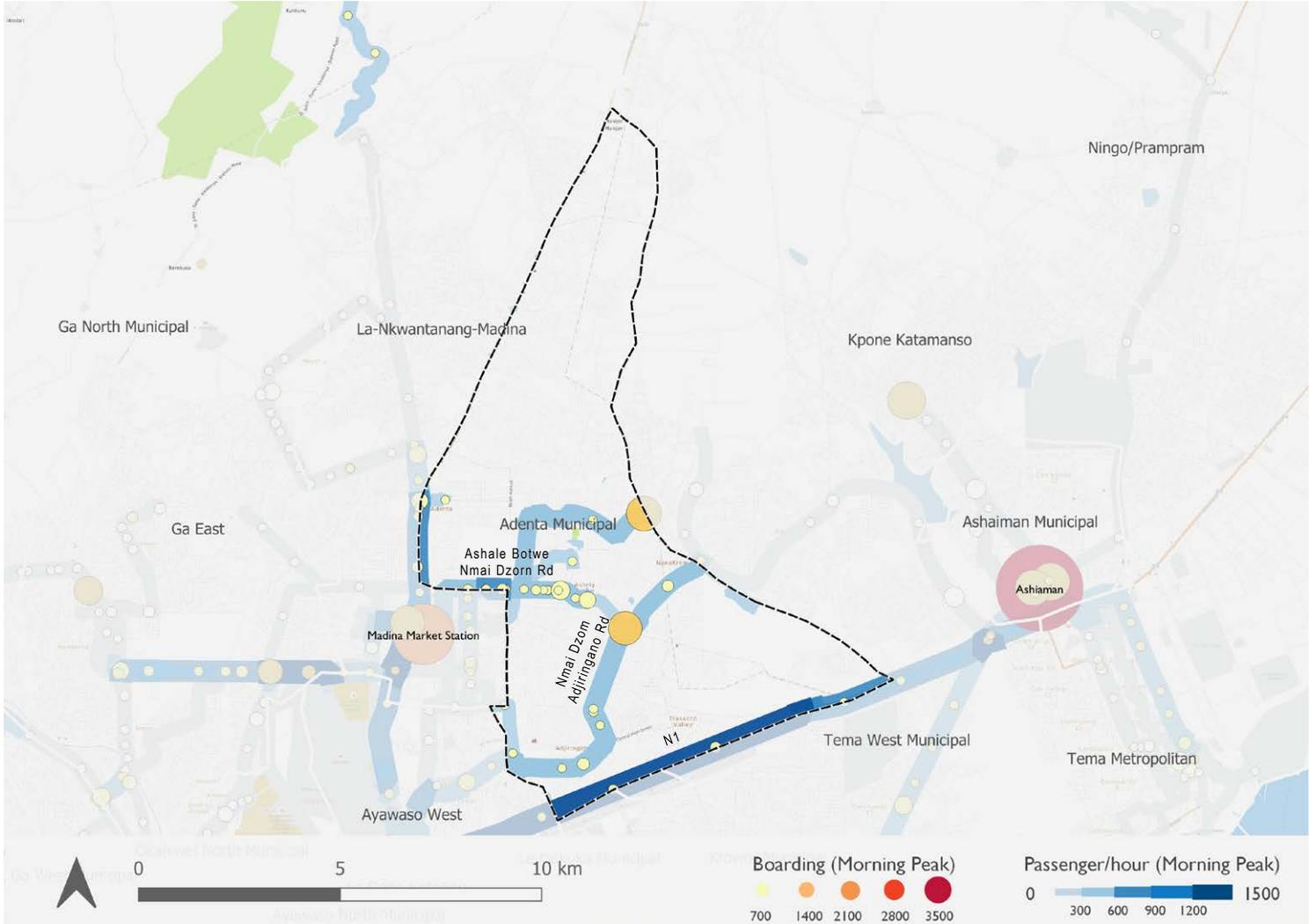


Ada West District Assembly

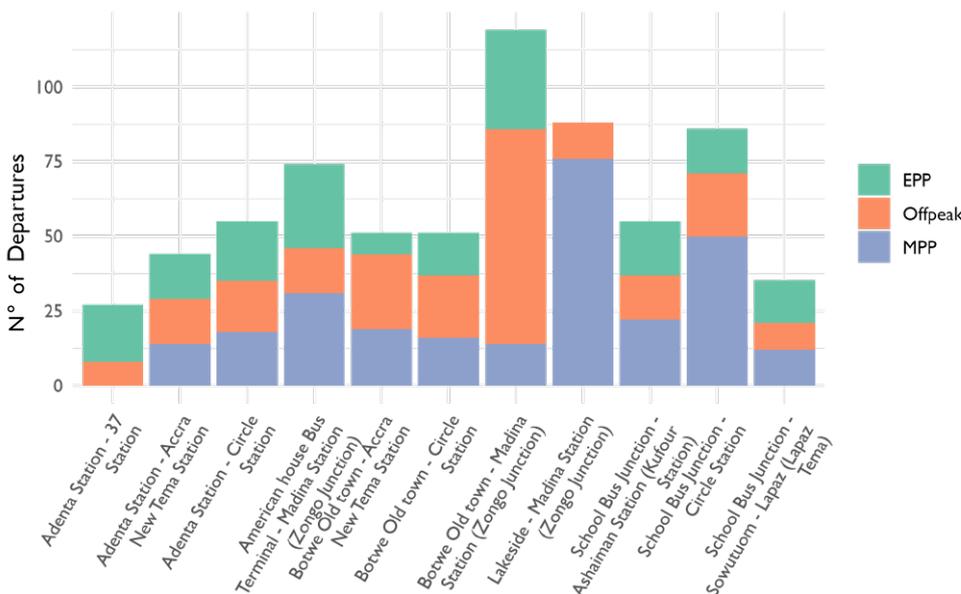


Adenta Municipal Assembly

(1/4)



Adenta Municipal



- 11 surveyed routes departing from the Assembly
- 8 surveyed routes with more than 50 daily departures
- Overall homogeneous passenger flows along the surveyed routes (up to 600 pax/hour during MPP) with a greater concentration along N1 Highway, bordering the Assembly
- Good stop distribution with stops clustered along Ashale Botwe Nmai Dzorn Rd
- No major congestion issues during peak periods despite some congested areas on Nmai Dzom Adjiringano Rd

Adenta Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Adenta Station - 37 Station	55	13,6	0,4	21,4	NA	0:40	13	1198	4
Adenta Station - Accra New Tema Station	55	19,1	0,5	16,4	16,2	1:05	17	778	5
Adenta Station - Circle Station	35	19,2	0,4	11,1	NA	1:45	13	732	4
American house Bus Terminal - Madina Station (Zongo Junction)	86	5,2	0,6	NA	8,3	0:40	8	1813	4
Botwe Old town - Accra New Tema Station	44	21,5	0,6	1612,5	14,9	0:45	23	973	4

Adenta Municipal Assembly

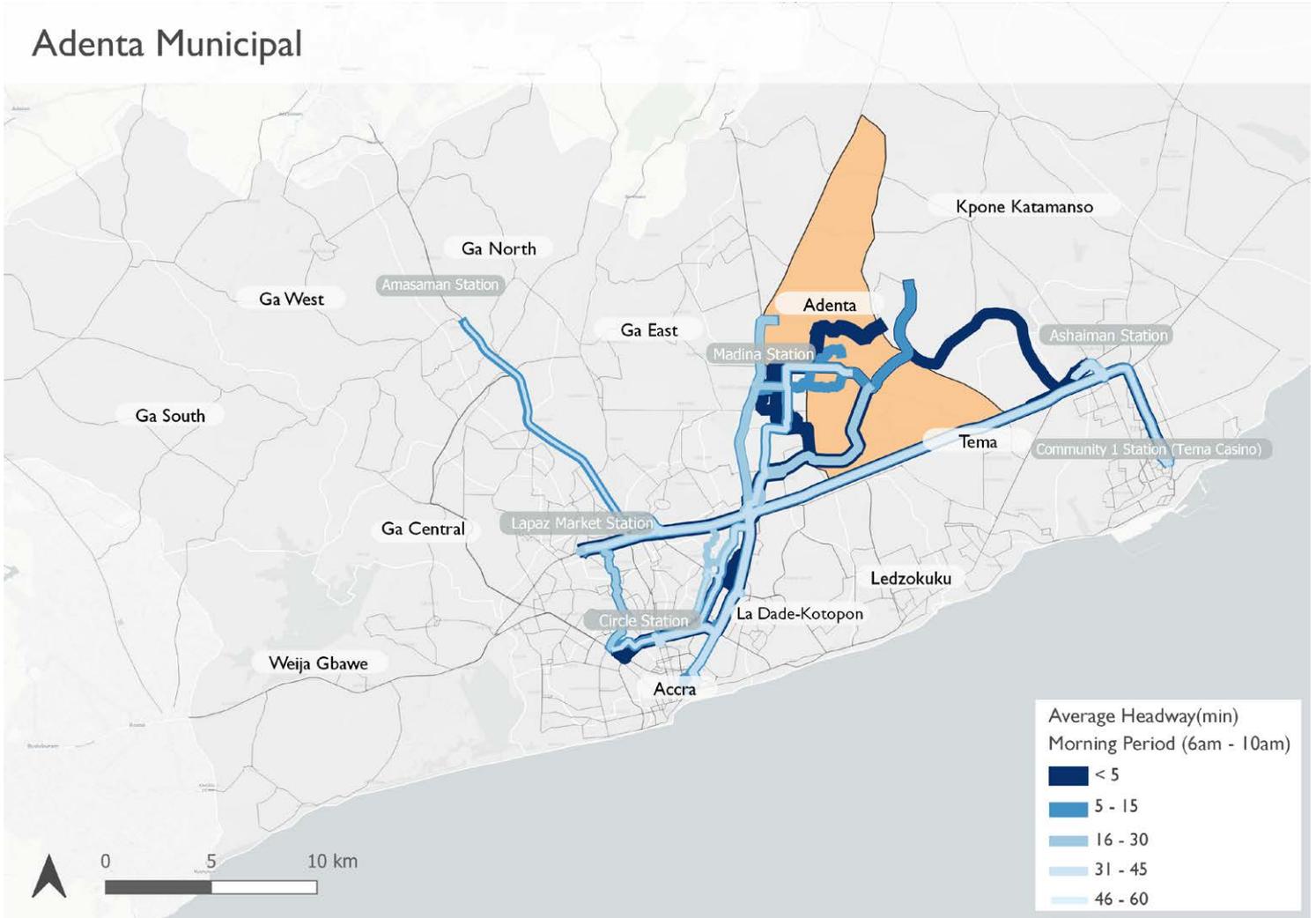
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Botwe Old town - Circle Station	74	20,8	0,8	14,3	11,6	1:40	16	308	4
Botwe Old town - Madina Station (Zongo Junction)	51	5,3	1,5	14,8	NA	0:20	12	1124	2
Lakeside - Madina Station (Zongo Junction)	27	8,9	0,4	18,6	17,4	0:25	3	669	3
School Bus Junction - Ashaiman Station (Kufour Station)	119	14,9	0,9	12,6	14,5	1:05	12	1610	5
School Bus Junction - Circle Station	88	21,1	0,5	20,1	NA	0:55	10	1008	5
School Bus Junction - Sowutuom - Lapaz (Lapaz Tema)	51	20	0,3	19,0	14,5	1:20	19	886	5

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

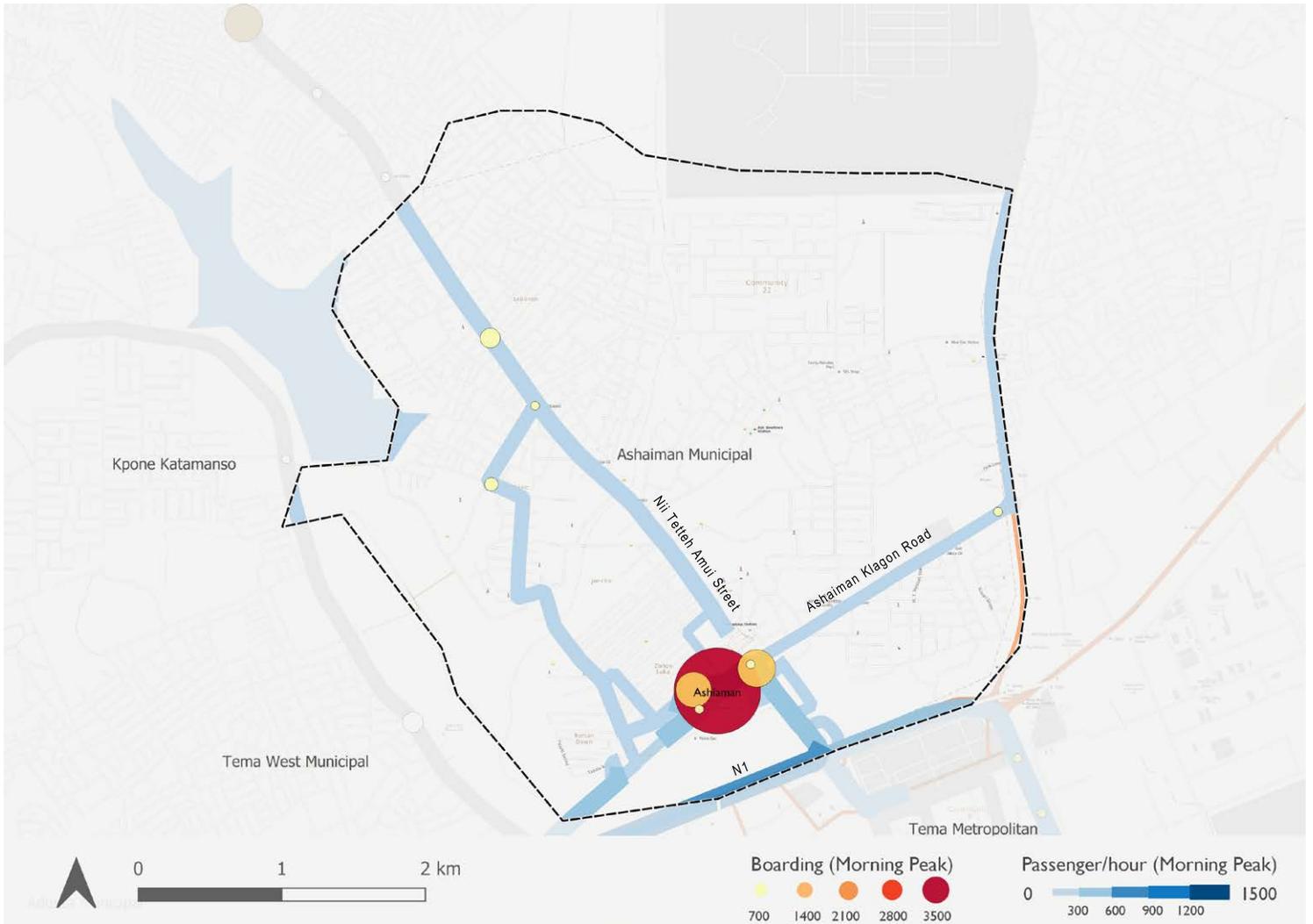
Adenta Municipal Assembly

(4/4)

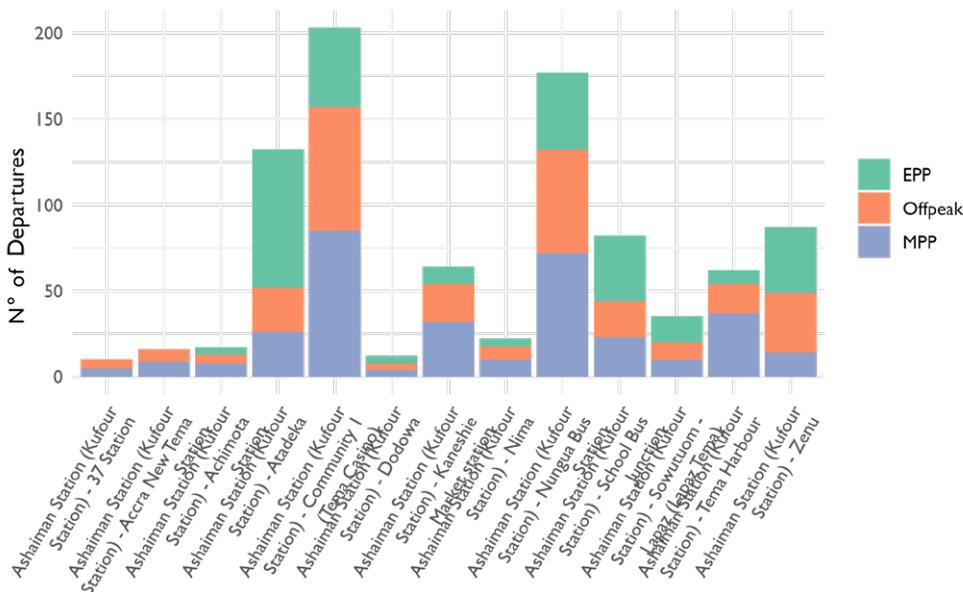


Ashaiman Municipal Assembly

(1/4)



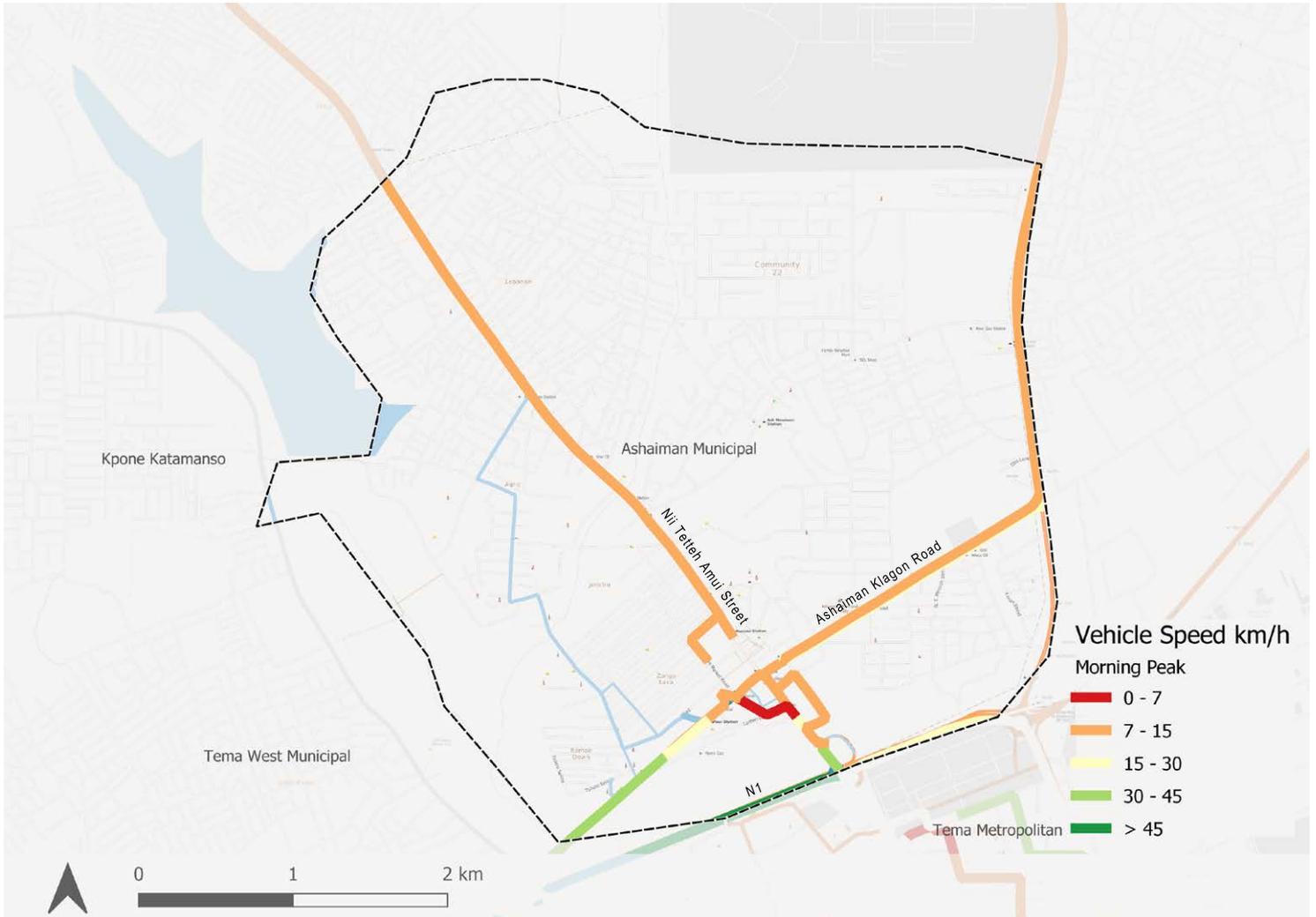
Ashaiman Municipal



- 13 surveyed routes departing from the Assembly
- 7 surveyed routes with more than 50 daily departures
- One principal terminal: Ashaiman with about 3'500 boarding during MPP
- Few stops along the surveyed routes within the Assembly: little possibility for passengers wishing to board outside Ashaiman terminal
- Overall homogeneous passenger flows along the routes (up to 600 pax/hour during MPP)
- Important congestion during PP along main axes (Nii Tetteh Amui Street and Ashaiman Klagon Road)

Ashaiman Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Ashaiman Station (Kufour Station) - 37 Station	22	25,6	0,2	17,9	27,6	1:15	45	372	7
Ashaiman Station (Kufour Station) - Accra New Tema Station	87	30,7	0,2	20,3	21,4	1:40	28	1328	7
Ashaiman Station (Kufour Station) - Achimota Station	64	28	0,1	27,7	25,2	1:00	45	1950	8

Ashaiman Municipal Assembly

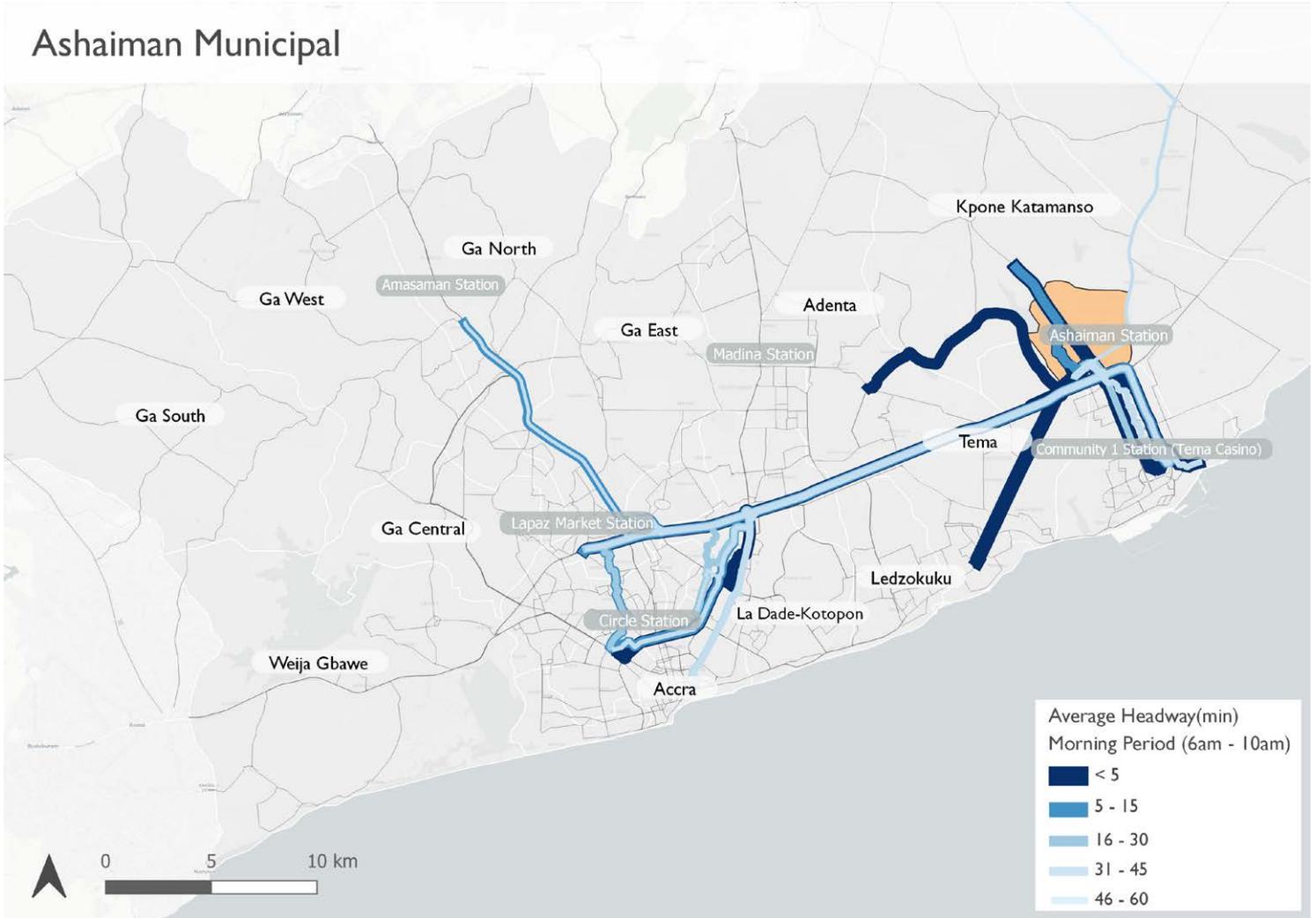
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Ashaiman Station (Kufour Station) - Atadeka	12	7,1	2,0	11,4	NA	0:40	6	236	2
Ashaiman Station (Kufour Station) - Community 1 (Tema Casino)	203	7,4	0,8	12,7	14,8	0:30	4	2770	3
Ashaiman Station (Kufour Station) - Dodowa	17	34,8	0,3	13,6	13,9	2:40	60	365	7
Ashaiman Station (Kufour Station) - Kaneshie Market station	16	30,8	0,3	25,4	20,4	1:30	16	427	7
Ashaiman Station (Kufour Station) - Nima	82	28	0,1	21,7	23,1	1:15	42	1973	7
Ashaiman Station (Kufour Station) - Nungua Bus Station	10	10,8	1,2	15,3	17,3	0:40	4	180	3
Ashaiman Station (Kufour Station) - School Bus Junction	62	15,3	0,9	12,3	21,9	1:00	8	970	4
Ashaiman Station (Kufour Station) - Sowutuom - Lapaz (Lapaz Tema)	35	28,9	0,1	28,1	32,3	1:00	21	740	8
Ashaiman Station (Kufour Station) - Tema Harbour	177	10,6	0,4	17,1	12,1	0:50	18	3789	4
Ashaiman Station (Kufour Station) - Zenu	132	6,9	1,4	11,7	12,6	0:35	12	2550	2

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

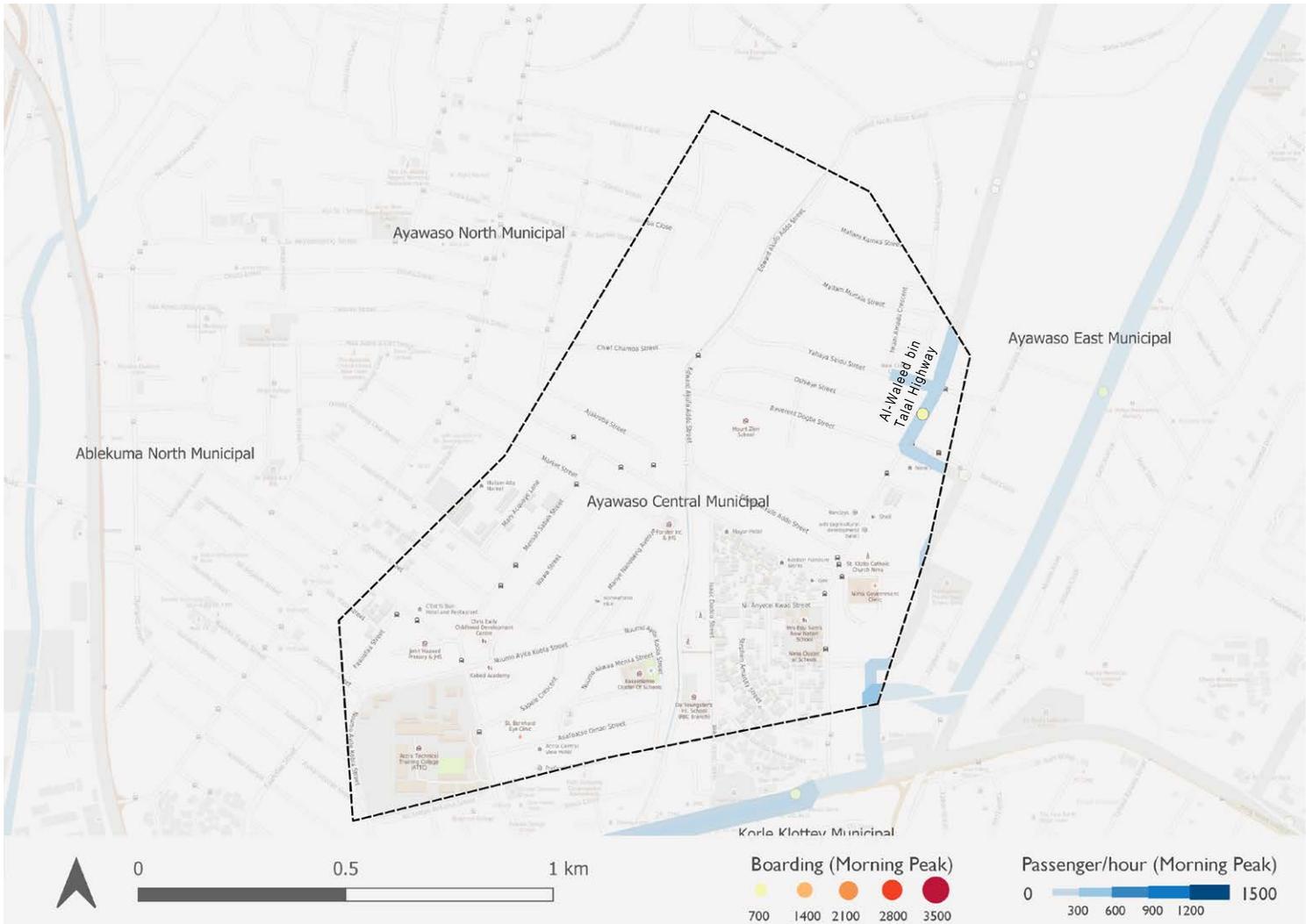
Ashaiman Municipal Assembly

(4/4)

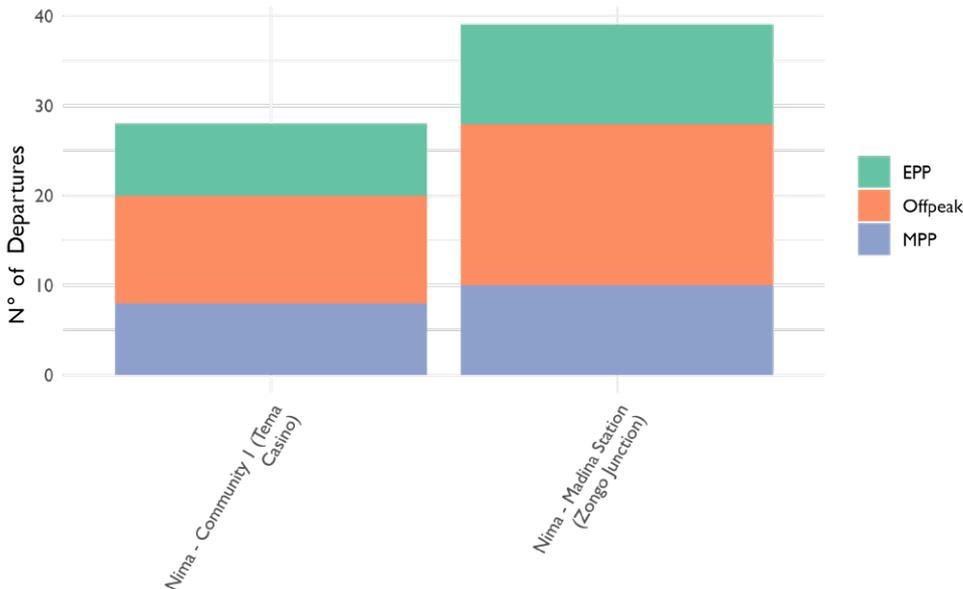


Ayawaso Central Municipal Assembly

(1/3)



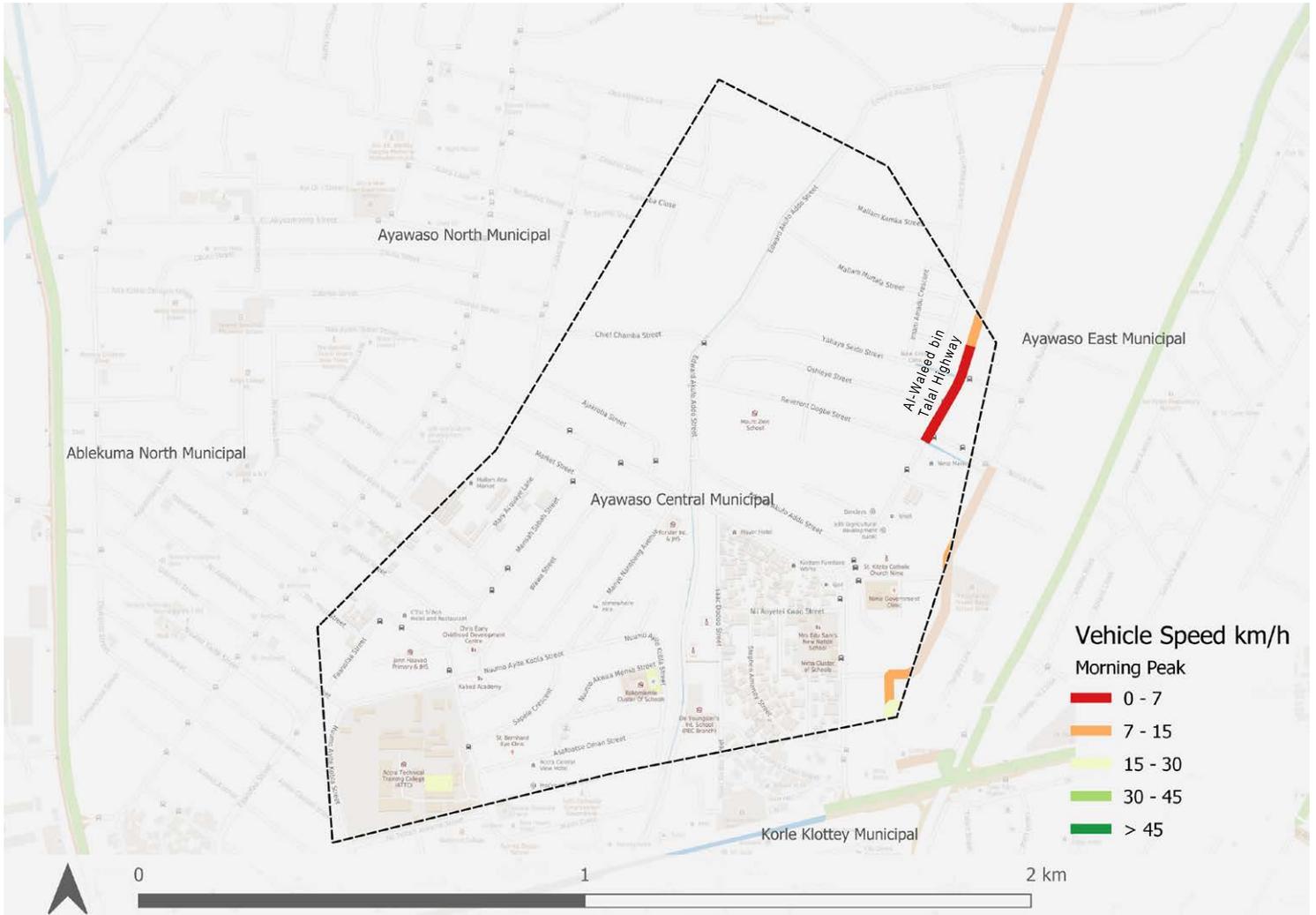
Ayawaso Central Municipal



- 2 surveyed routes departing from the Assembly with between 30 and 40 daily departures
- One single stop within the Assembling registering up to 700 boarding during MPP
- Overall homogeneous passenger flows along the routes (up to 300 pax/hour during MPP)
- Strong congestion along Al-Waleed bin Talal Highway during PP

Ayawaso Central Municipal Assembly

(2/3)

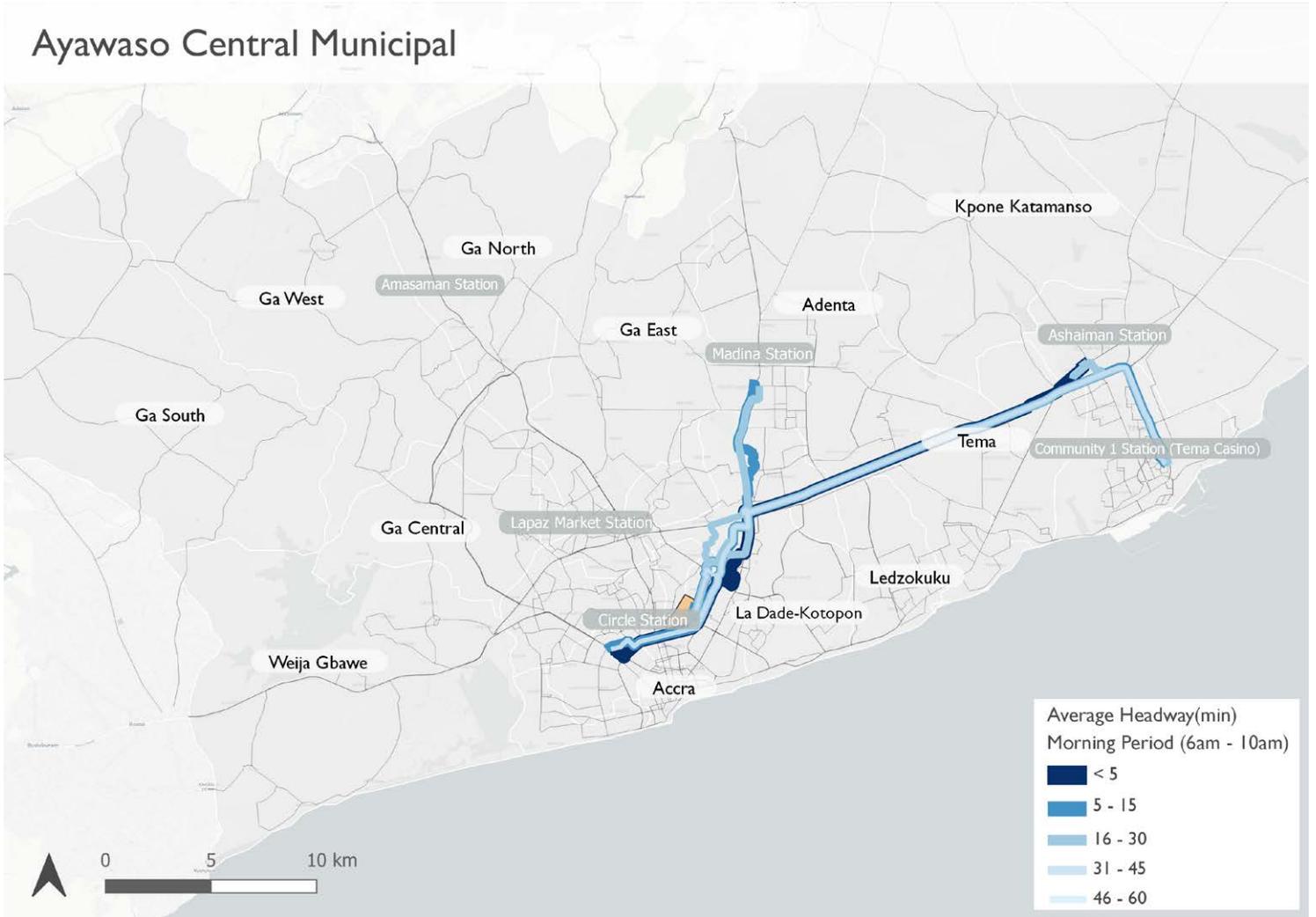


Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
■ Trotro ■ Shared taxi Nima - Community 1 (Tema Casino)	28	31,2	0,1	17,9	23,3	01:20	30	256	11
Nima - Madina Station (Zongo Junction)	39	14,5	0,3	13,3	10,8	01:15	23	364	4

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

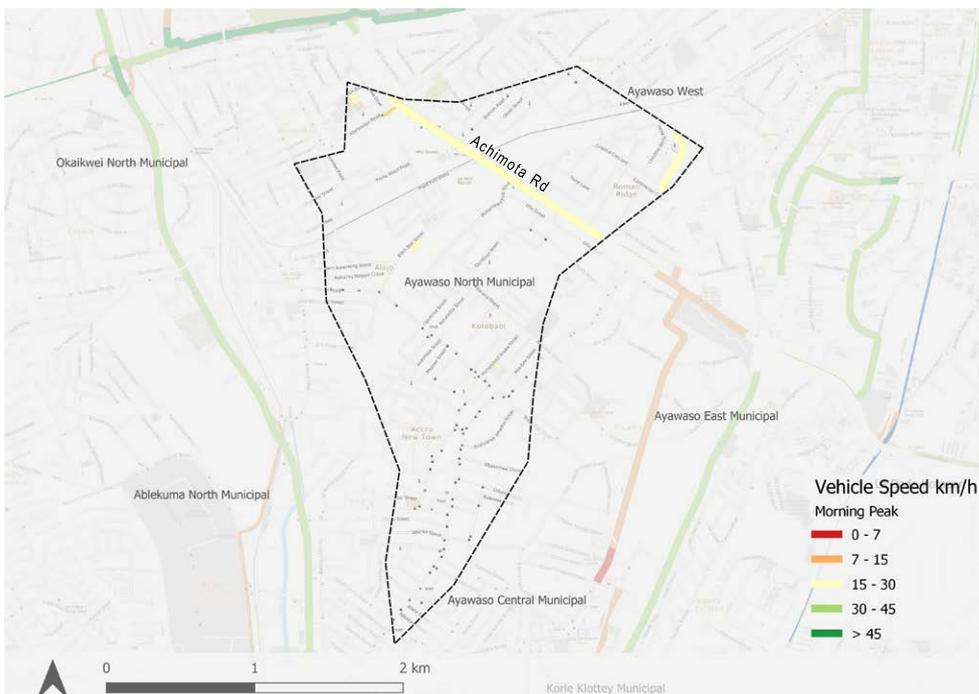
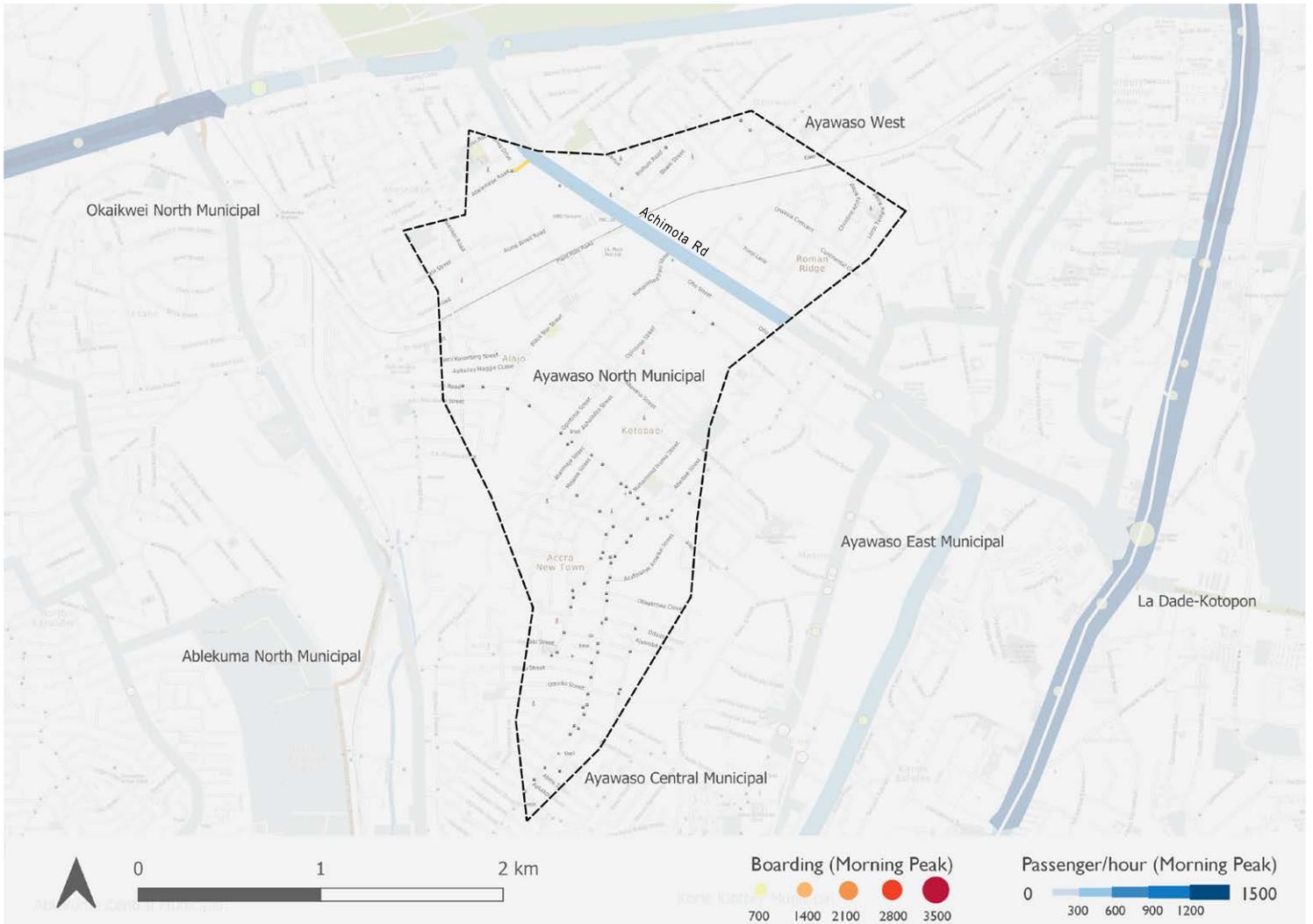
Ayawaso Central Municipal Assembly

(3/3)



Ayawaso North Municipal Assembly

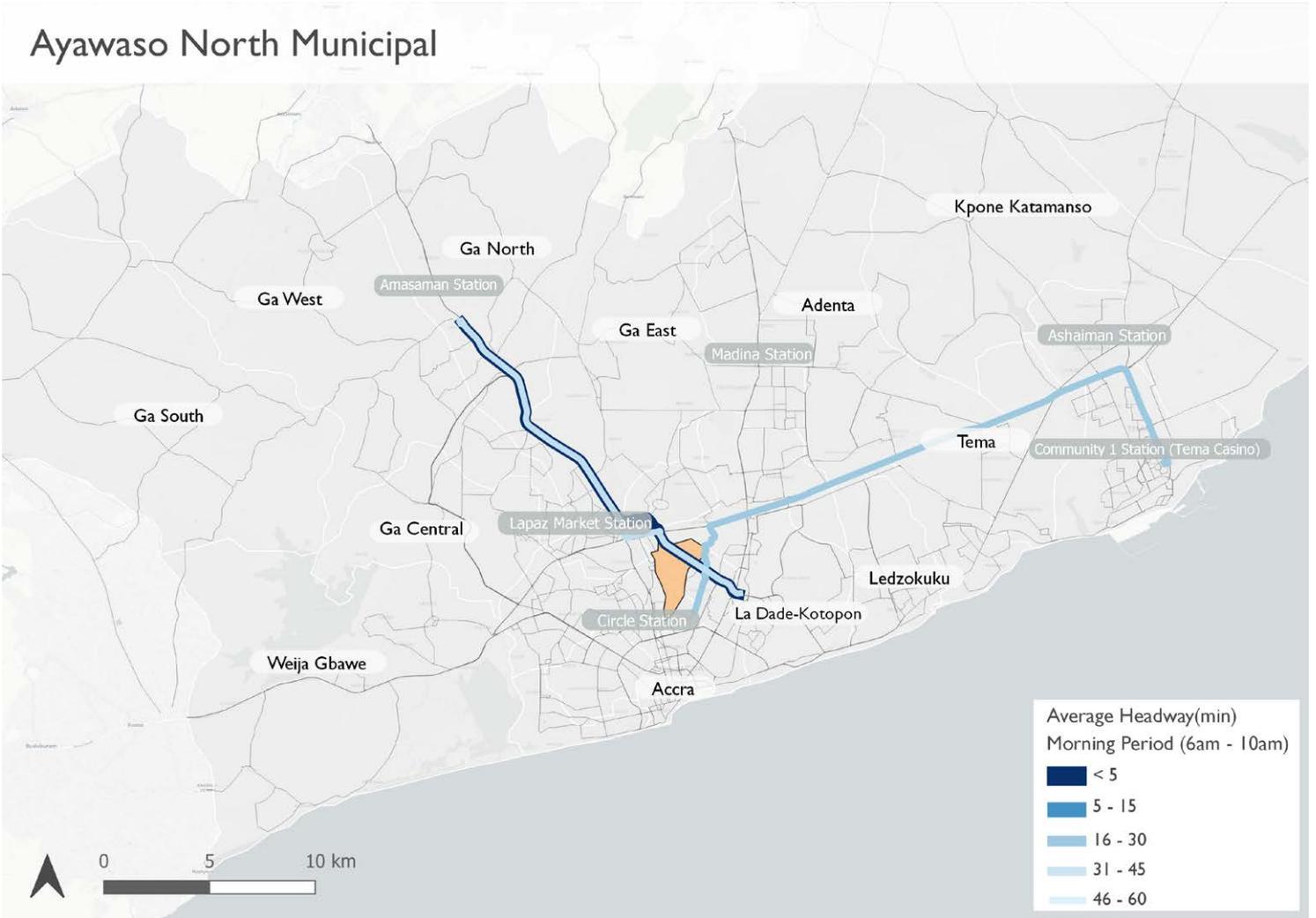
(1/2)



- No terminals and stops within the Assembly for the surveyed routes: routes transiting the Assembly
- Up to 300 pax/hour transiting through the Assembly during MPP
- No major congestion issues during PP (vehicle speed between 15 and 30 km/h during MPP)

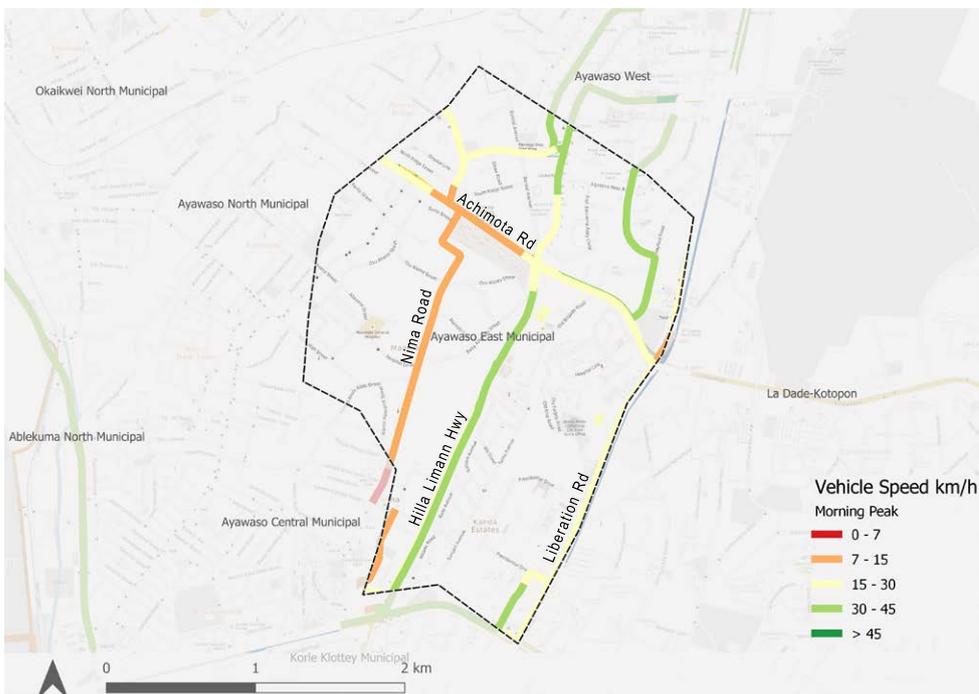
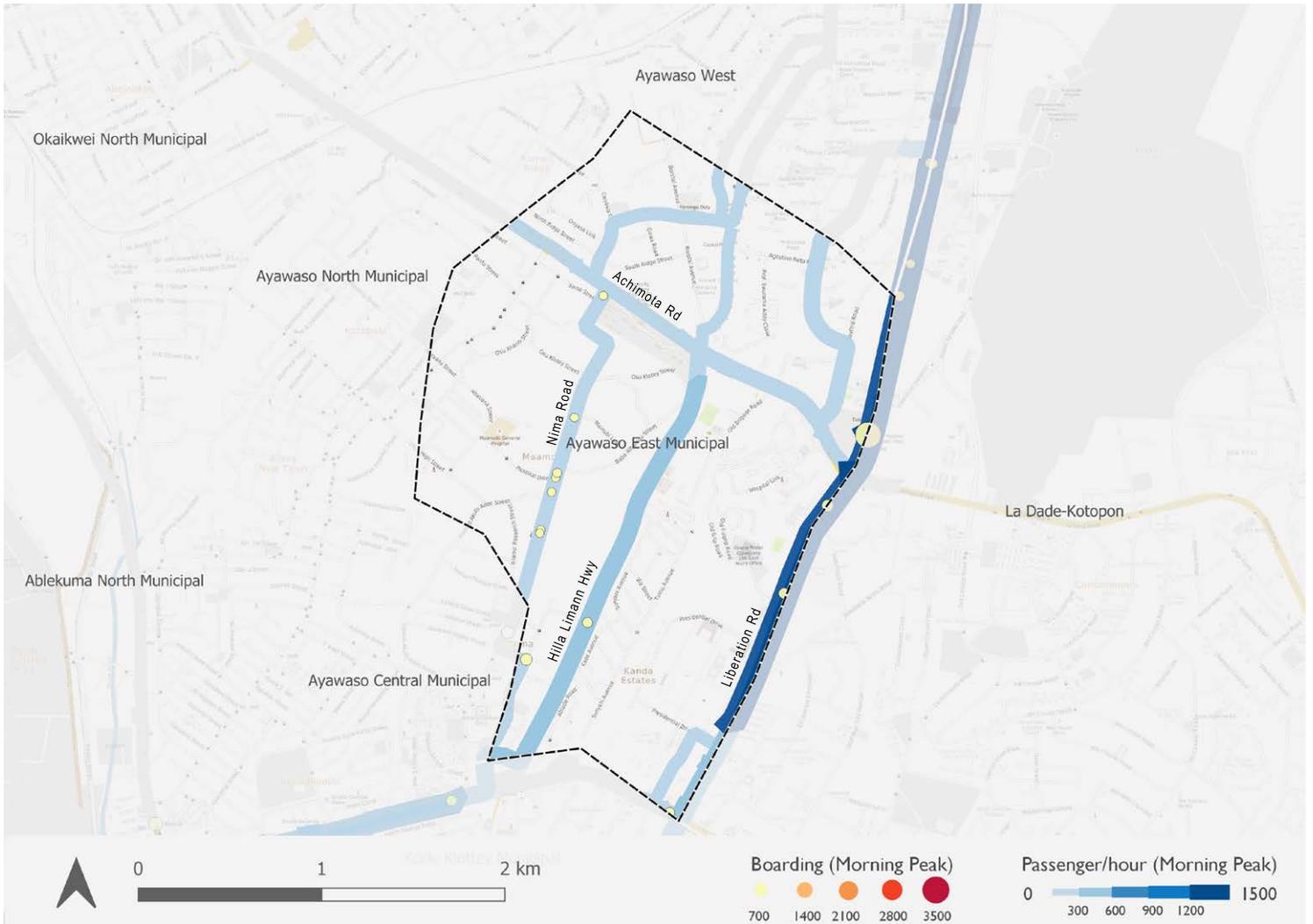
Ayawaso North Municipal Assembly

(2/2)



Ayawaso East Municipal Assembly

(1/2)



- No terminals in the Assembly for the surveyed routes: routes transiting the Assembly
- Anarchic distribution of stops with most stops clustered along Nima Road and with few or no stops along other routes within the Assembly
- Up to 600 pax/hour during MPP with a greater concentration along Liberation Rd (up to 1'200 pax/hour)
- No congestion issues except along Nima Road during PP (vehicle speed between 7 and 15 km/h during MPP)

Ayawaso East Municipal Assembly

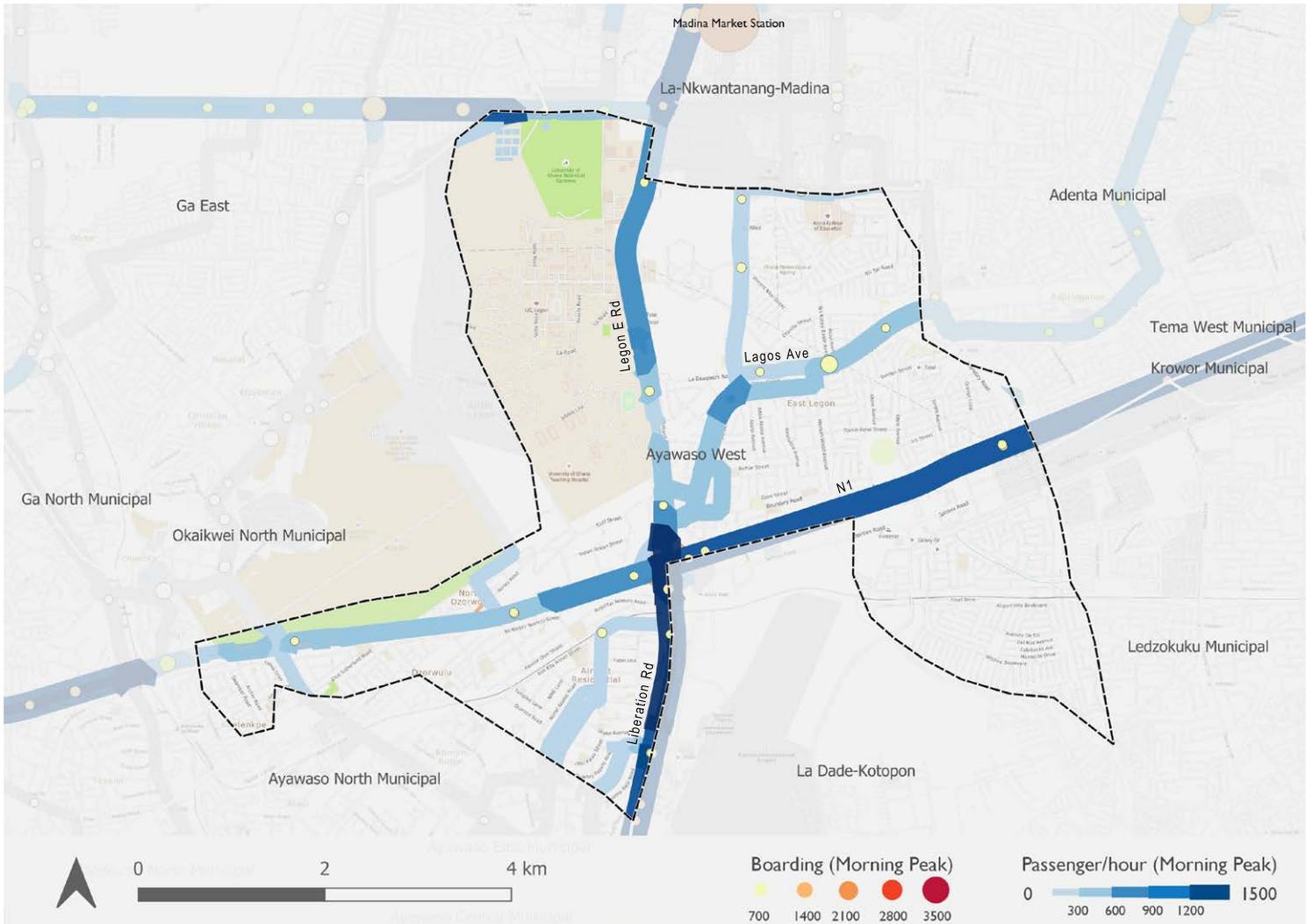
(2/2)

Ayawaso East Municipal

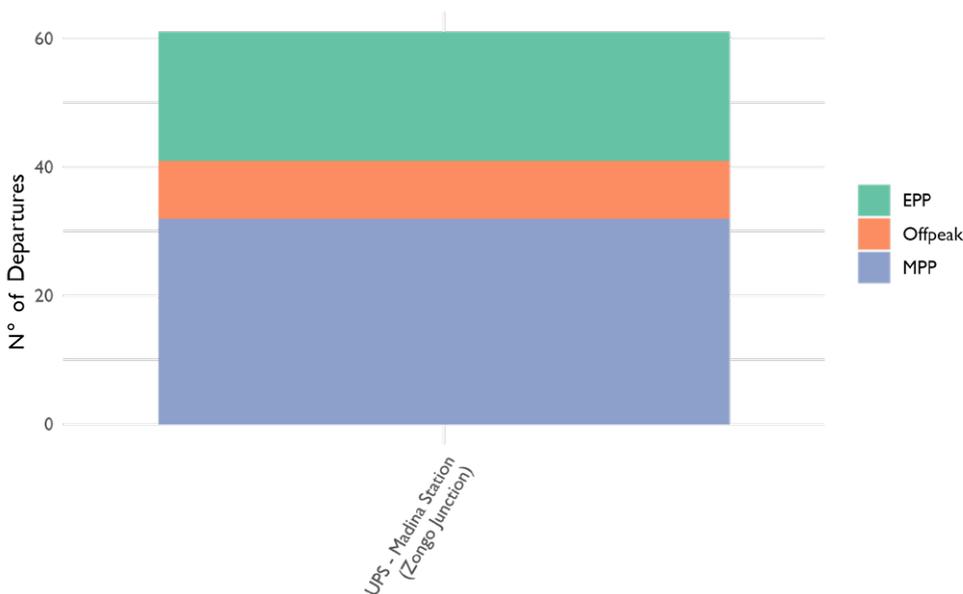


Ayawaso West Municipal Assembly

(1/3)



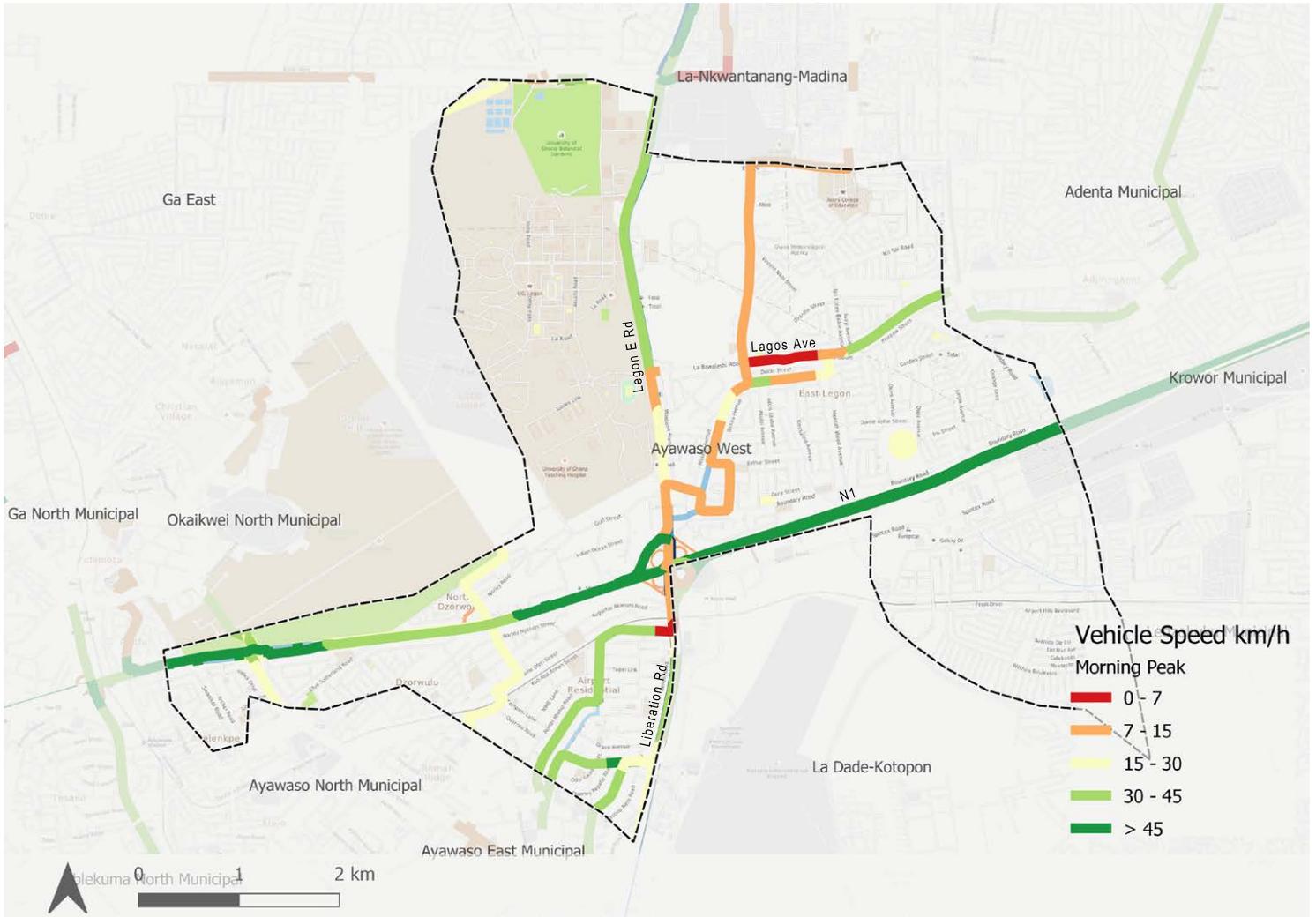
Ayawaso West



- 1 surveyed route departing from the Assembly with more than 60 departures a day
- Important passenger flows within the area, especially along N1 Highway and Liberation/Legon E Rd (up to 1'500 pax/hour during MPP along Liberation Rd)
- Good distribution of stops along the surveyed routes
- Strong congestion issues on Lagos Ave and at the intersection between Liberation Rd and Patrice Lumumba, in the southern part of the Assembly during PP

Ayawaso West Municipal Assembly

(2/3)

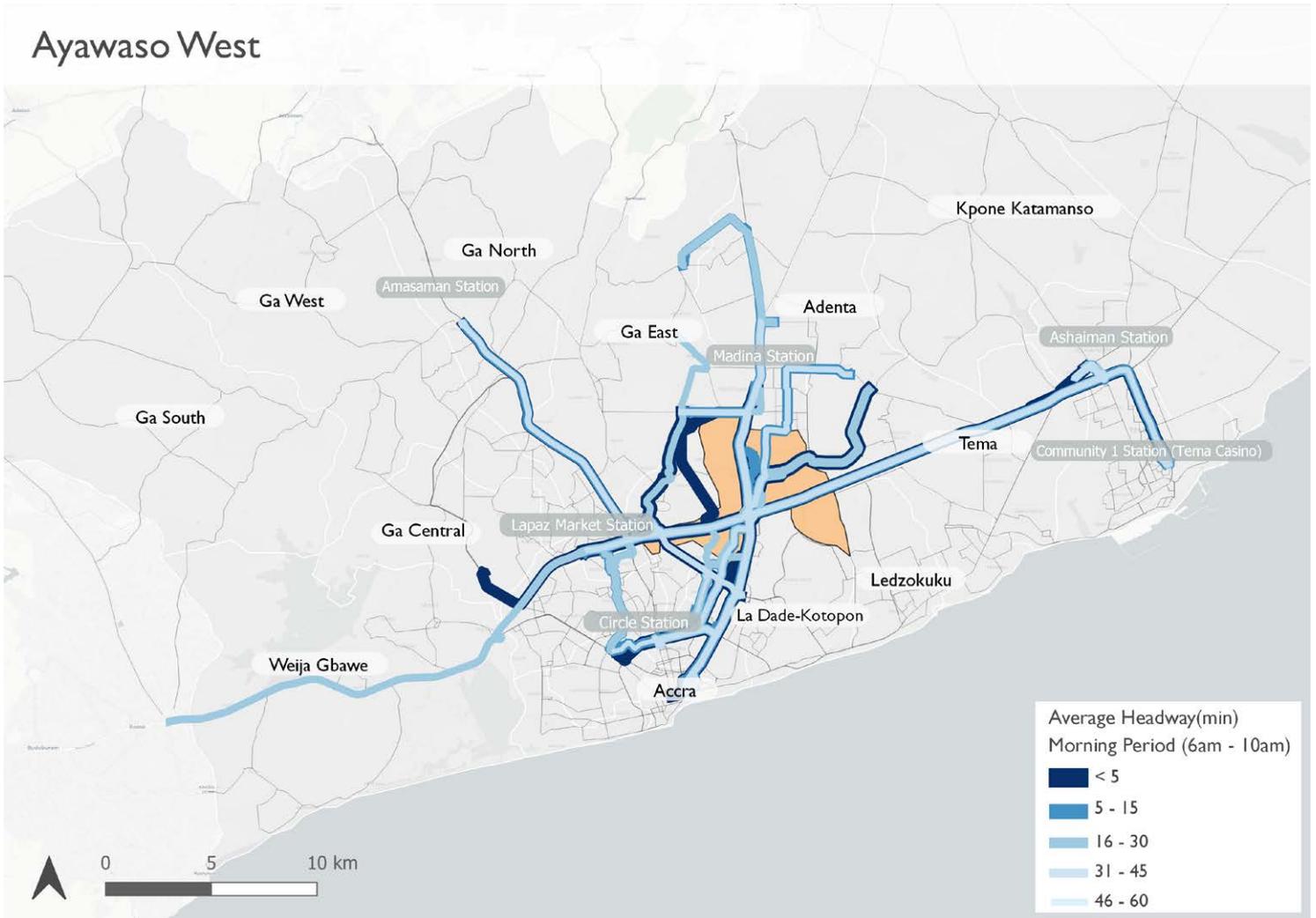


Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
■ Trotro ■ Shared taxi									
UPS - Madina Station (Zongo Junction)	61	2,6	0,8	NA	15,9	00:10	10	73	5

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

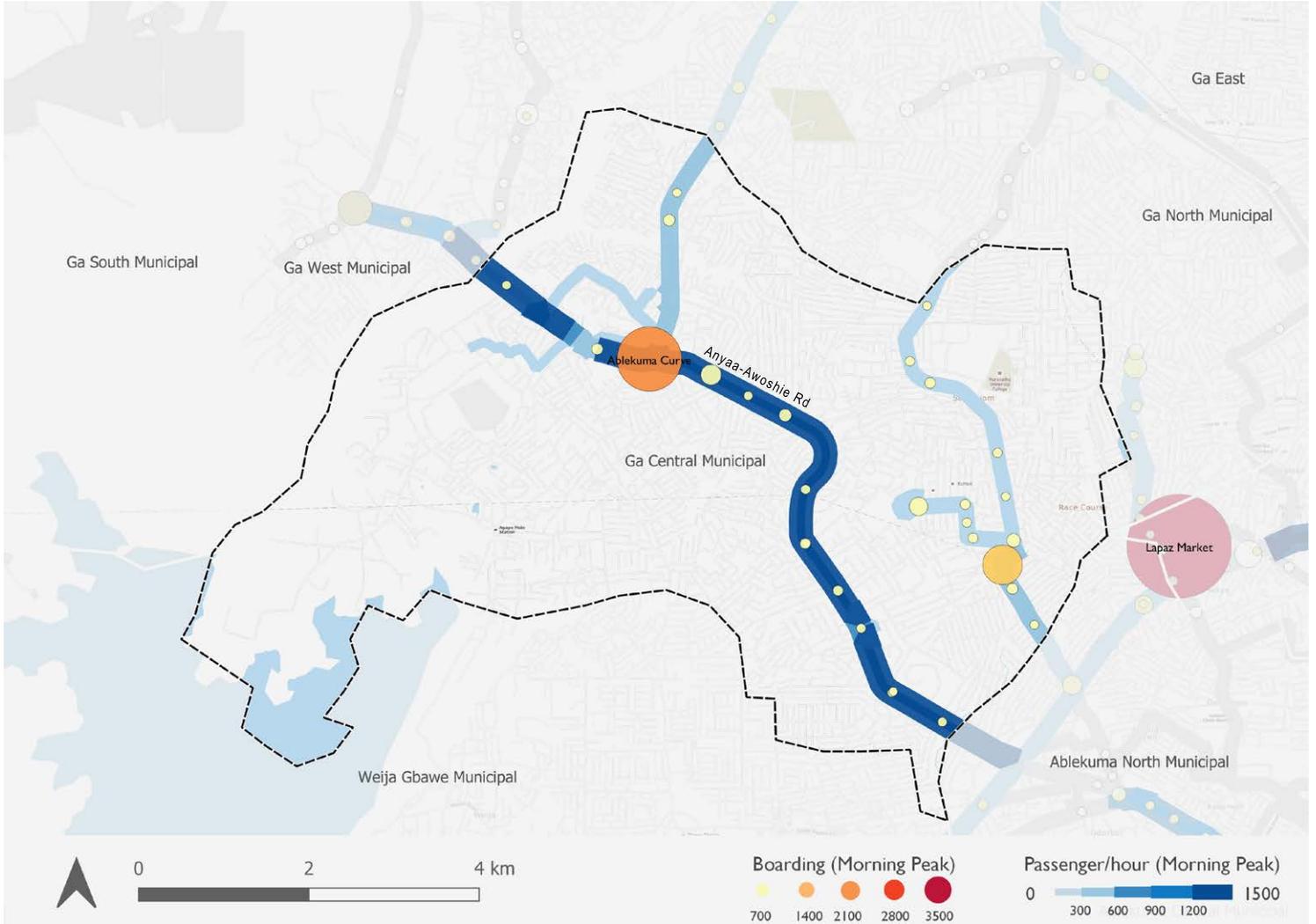
Ayawaso West Municipal Assembly

(3/3)

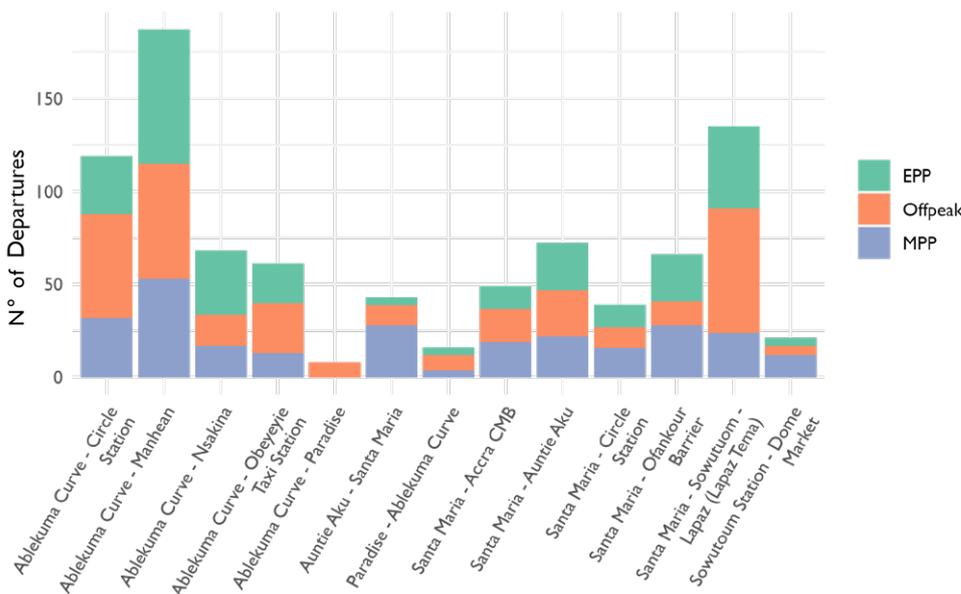


Ga Central Municipal Assembly

(1/4)



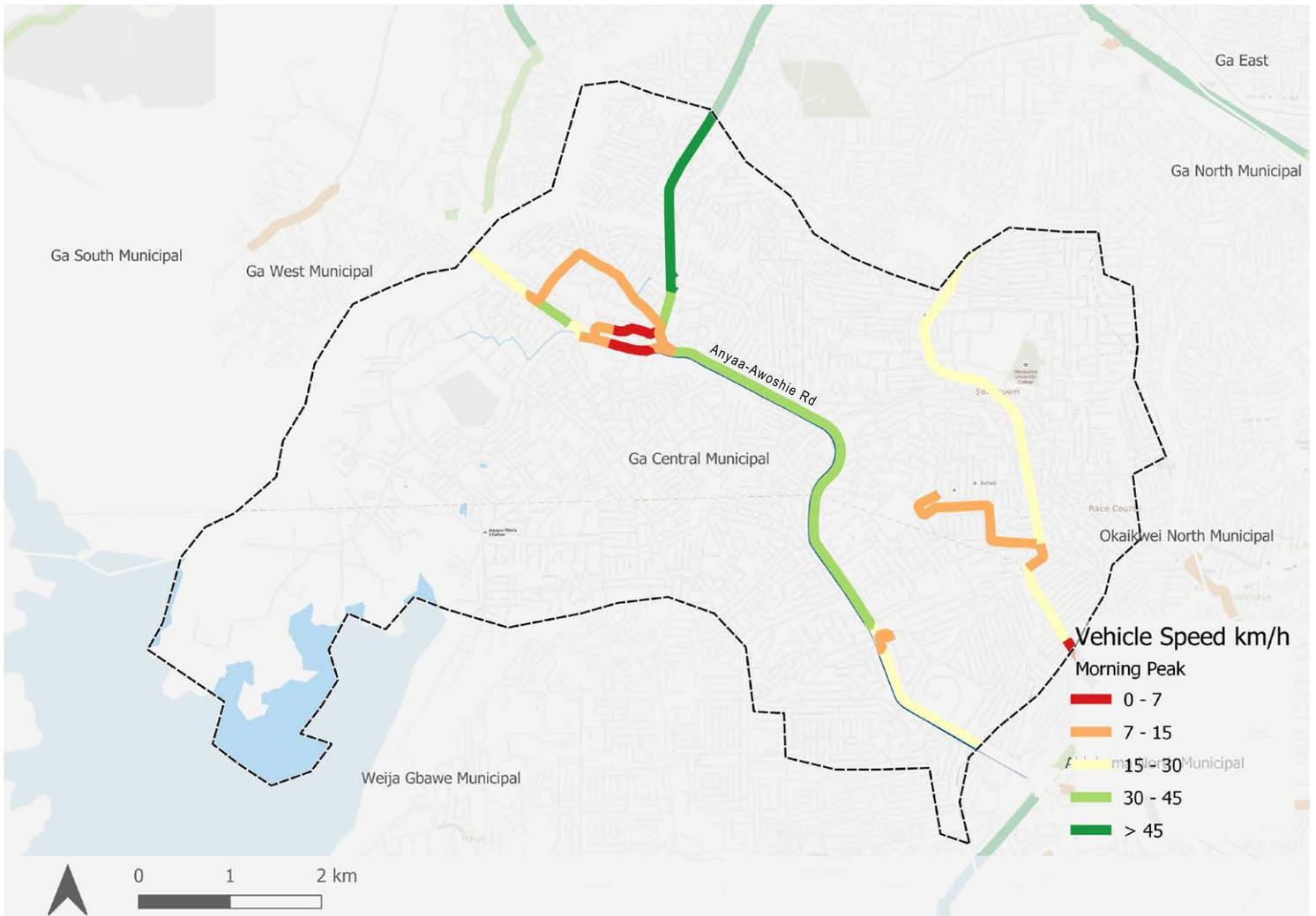
Ga Central Municipal



- 13 surveyed routes departing from the District
- 7 surveyed routes with more than 50 daily departures
- One main terminal: Ablekuma Curve with approx. 2'100 boarding during MPP (congestion issues around the terminal)
- Good distribution of stops along the surveyed routes
- Important passenger flows along Anyaa-Awoshie Rd (up to 1'200 pax/hour during MPP)

Ga Central Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Ablekuma Curve - Circle Station	68	14,5	0,7	12,9	15	0:55	8	1479	4
Ablekuma Curve - Manhean	8	4,1	0,7	16,8	16,3	0:15	4	32	2
Ablekuma Curve - Nsakina	72	5,6	1,1	16,7	11,6	0:25	11	620	2
Ablekuma Curve - Obeyeyie Taxi Station	66	8,6	0,3	27,7	24,2	0:20	15	576	4
Ablekuma Curve - Paradise	119	2,6	0,4	3,3	7,4	0:35	NA	2347	2
Auntie Aku - Santa Maria	16	2,4	0,9	14,5	18,2	0:10	34	8	1

Ga Central Municipal Assembly

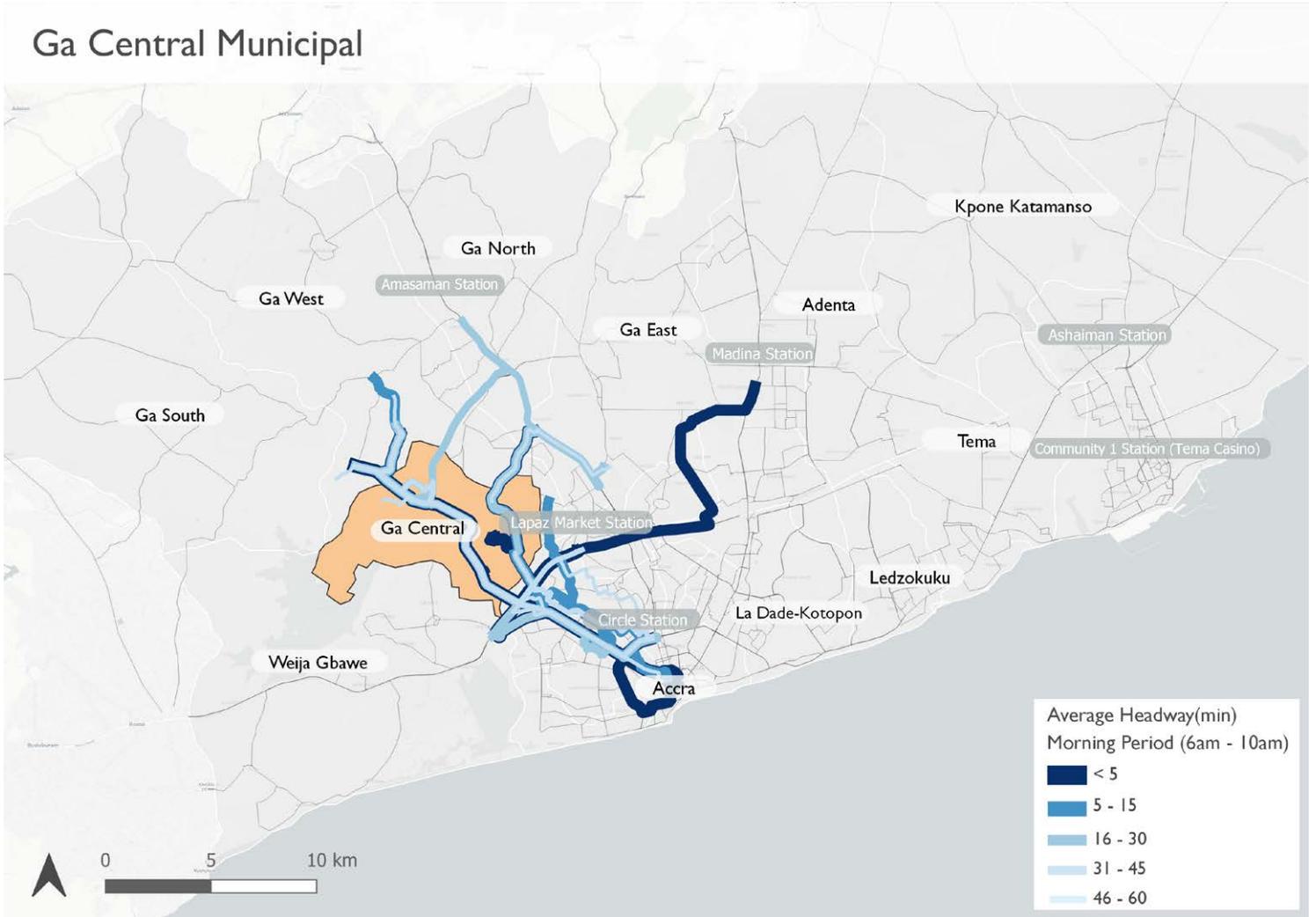
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Paradise - Ablekuma Curve	39	2,6	0,4	14,1	NA	0:10	60	464	2
Santa Maria - Accra CMB	43	13,1	0,5	11,1	12,9	1:00	16	528	3
Santa Maria - Auntie Aku	187	2,3	2,6	11,9	28,7	0:10	10	2076	1
Santa Maria - Circle Station	61	8,3	0,8	8,8	9,8	0:50	18	297	3
Santa Maria - Ofankour Barrier	49	7,5	0,7	16,5	19,8	0:25	9	910	3
Santa Maria - Sowutuom - Lapaz (Lapaz Tema)	135	4,6	1,3	9,4	9,3	0:25	8	1207	2
Sowutuom Station - Dome Market	21	10,3	1,3	9,7	16,6	0:50	40	263	3

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

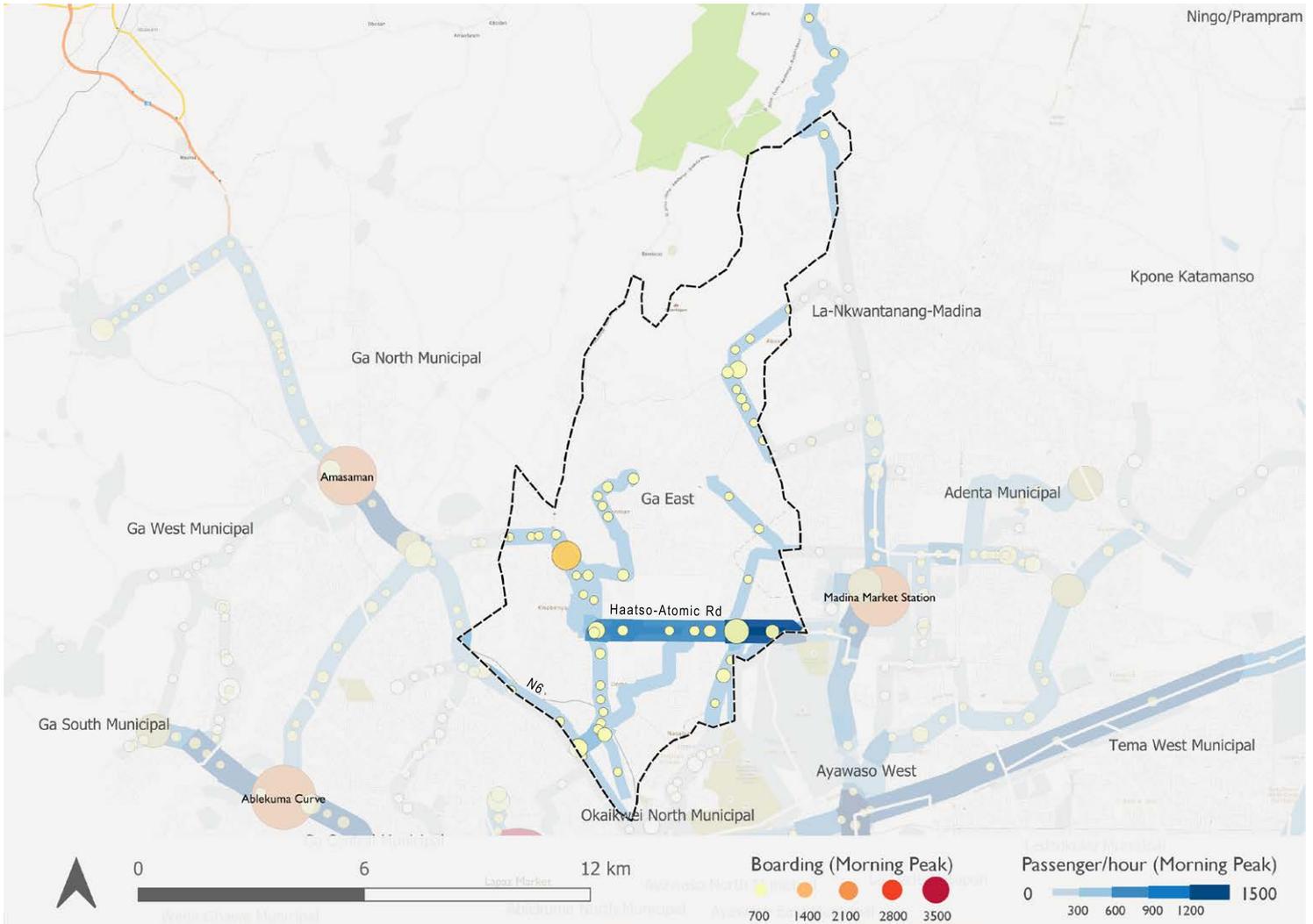
Ga Central Municipal Assembly

(4/4)

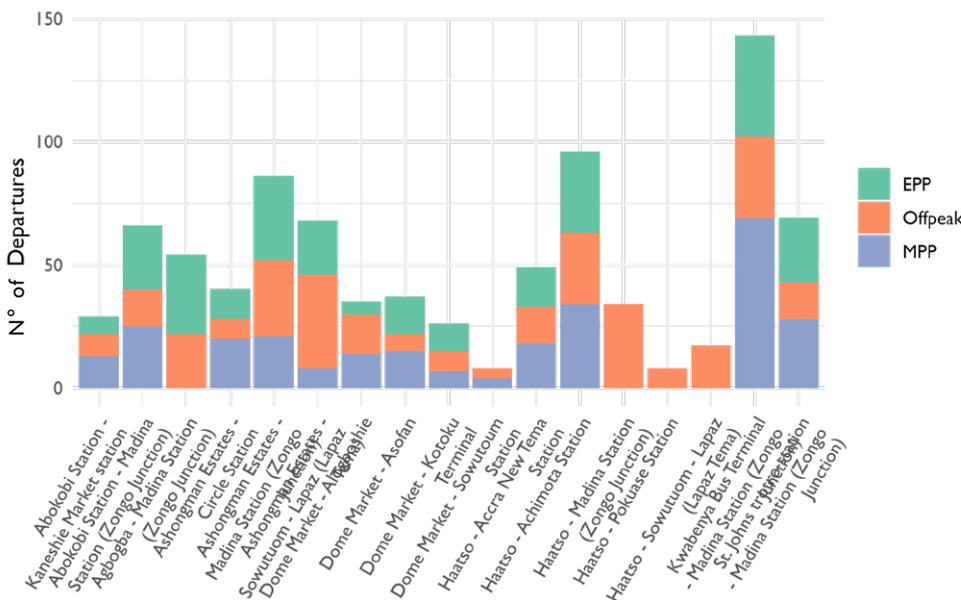


Ga East Municipal Assembly

(1/4)



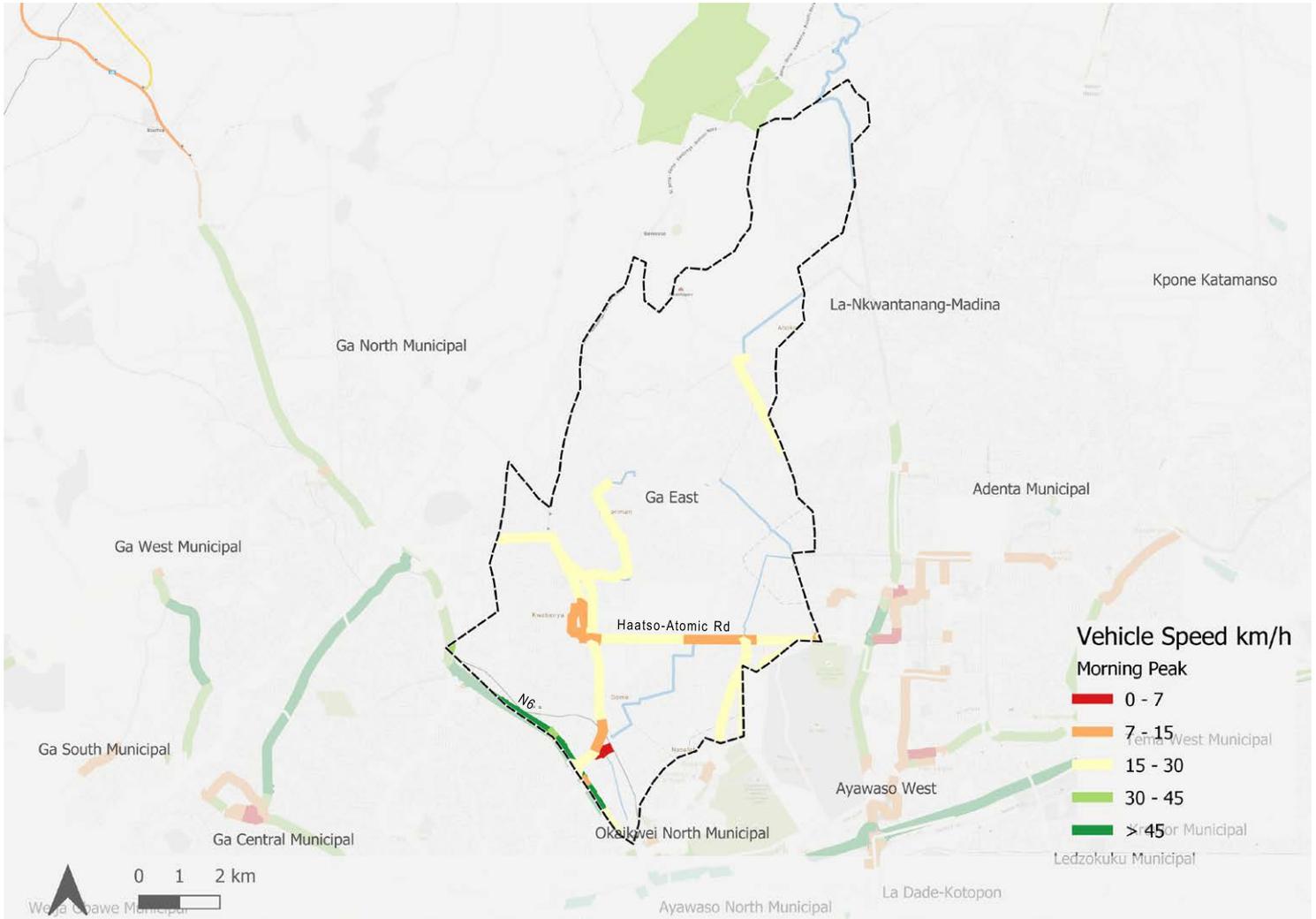
Ga East



- 17 surveyed routes departing from the Assembly
- 7 surveyed routes with more than 50 daily departures
- Surveyed routes form a good network within the Assembly (good territorial coverage)
- High density of stops along the routes within the Assembly (important number of stops per km)
- Overall homogeneous passenger flows within the area with a greater concentration along Haatso-Atomic Rd (up to 900 pax/hour during MPP)
- No major congestion issues but strong slowdowns at the intersection with N6 Highway (vehicle speed between 0 and 7 km/h during MPP)

Ga East Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Abokobi Station - Kaneshie Market station	35	29,8	1,0	22,9	NA	1:20	27	89	7
Abokobi Station - Madina Station (Zongo Junction)	8	10,3	1,6	13,2	12,2	0:50	10	80	3
Agbogba - Madina Station (Zongo Junction)	96	4	0,8	10,3	18	0:20	8	1051	2
Ashongman Estates - Circle Station	143	19	0,5	14,5	14,4	1:20	16	1680	4

Ga East Municipal Assembly

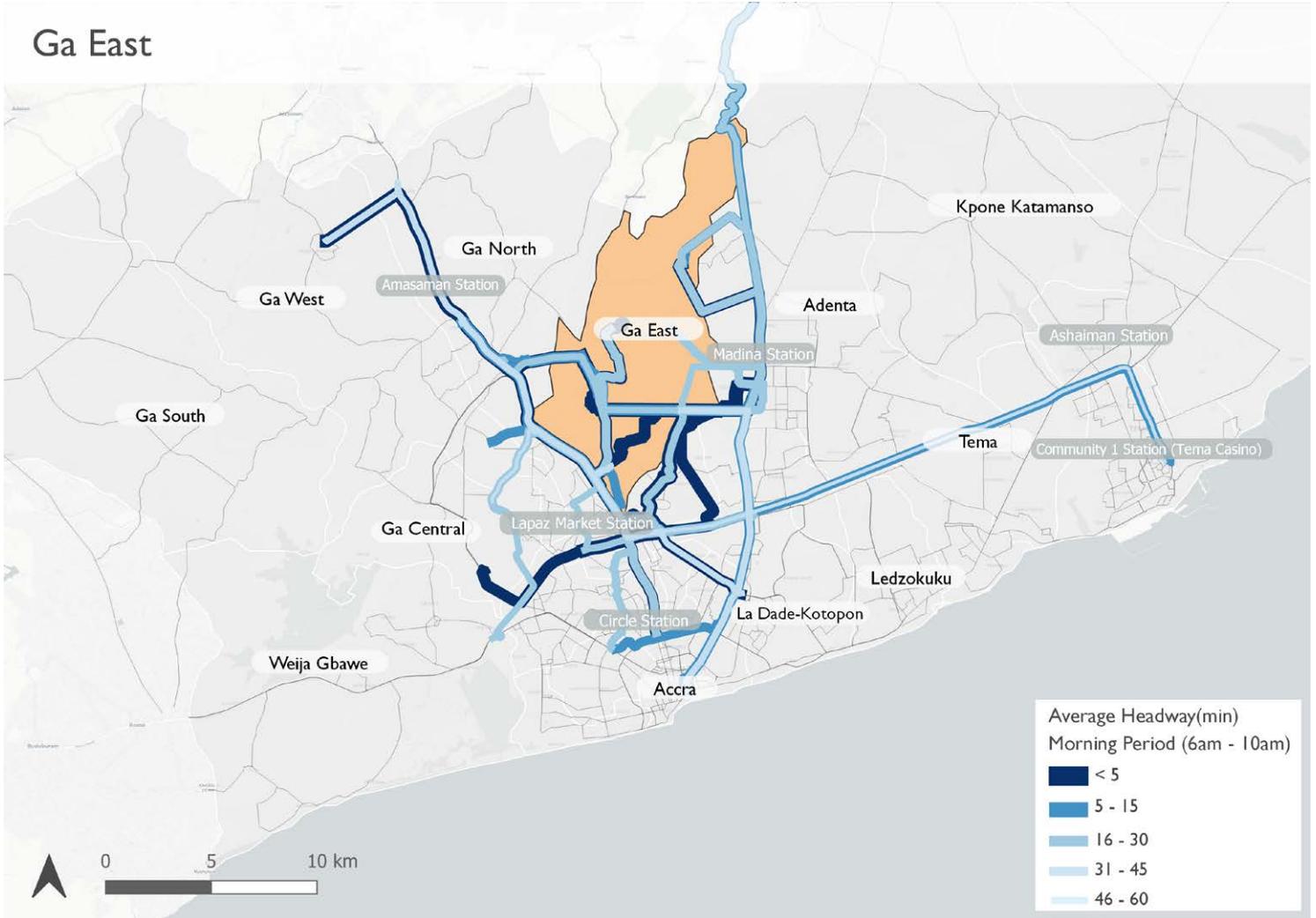
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Ashongman Estates - Madina Station (Zongo Junction)	26	14,9	1,1	13,9	13,4	1:05	9	425	5
Ashongman Estates - Sowutuom - Lapaz (Lapaz Tema)	86	15,7	0,6	14,9	23,3	0:50	20	1644	5
Dome Market - Alogboshie	40	1,9	2,2	5,8	NA	0:20	31	288	3
Dome Market - Asofan	54	6,4	1,9	17,2	15,4	0:25	16	880	3
Dome Market - Kotoku Terminal	69	23,4	0,6	19,6	12,6	1:30	30	1027	4
Dome Market - Sowutuom Station	49	9	1,0	11,8	NA	1:00	60	929	3
Haatso - Accra New Tema Station	34	17,6	0,7	22,9	13,1	1:05	14	306	5
Haatso - Achimota Station	68	7,3	1,1	14,1	14	0:30	7	844	2
Haatso - Madina Station (Zongo Junction)	37	4,9	1,4	16,2	NA	0:20	NA	587	2
Haatso - Pokuase Station	29	11,8	1,0	NA	15,3	0:45	NA	342	4
Haatso - Sowutuom - Lapaz (Lapaz Tema)	66	10,2	1,3	13,7	18,1	0:40	NA	1506	3
Kwabanya Bus Terminal - Madina Station (Zongo Junction)	8	12	0,6	12,6	22	0:45	5	144	3
St. Johns trotro station - Madina Station (Zongo Junction)	17	11,9	0,5	10,1	12,5	1:05	9	187	4

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

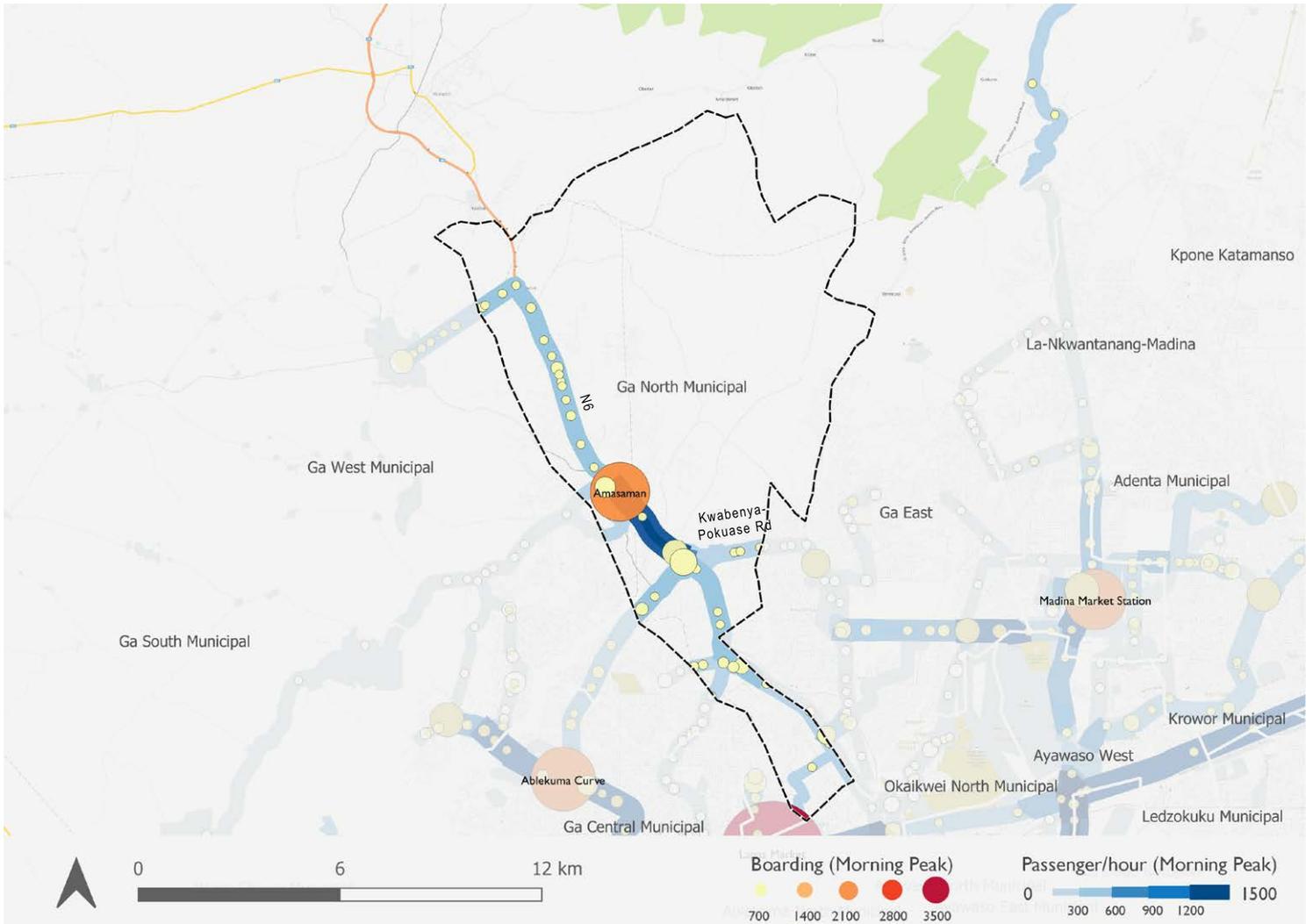
Ga East Municipal Assembly

(4/4)

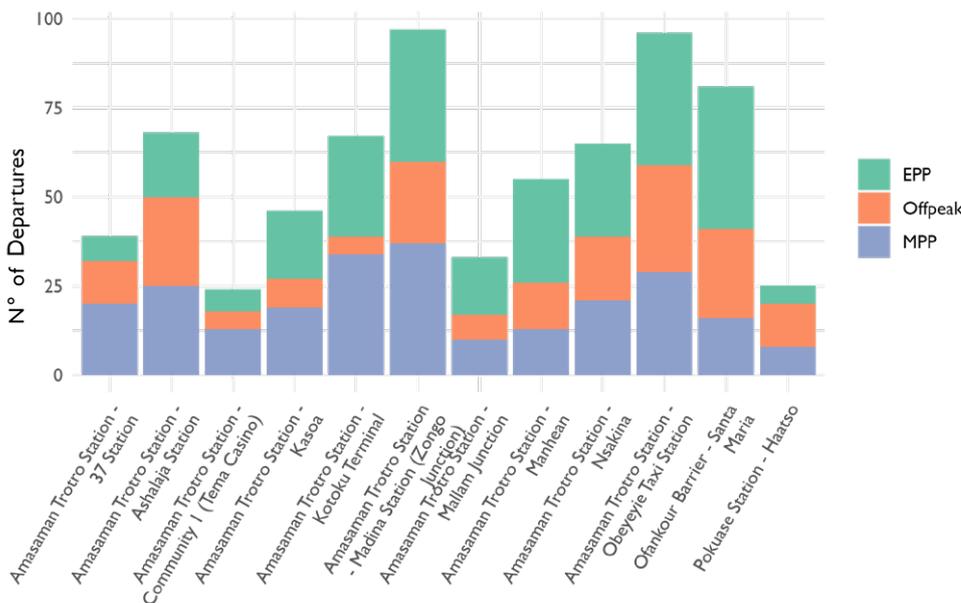


Ga North Municipal Assembly

(1/4)



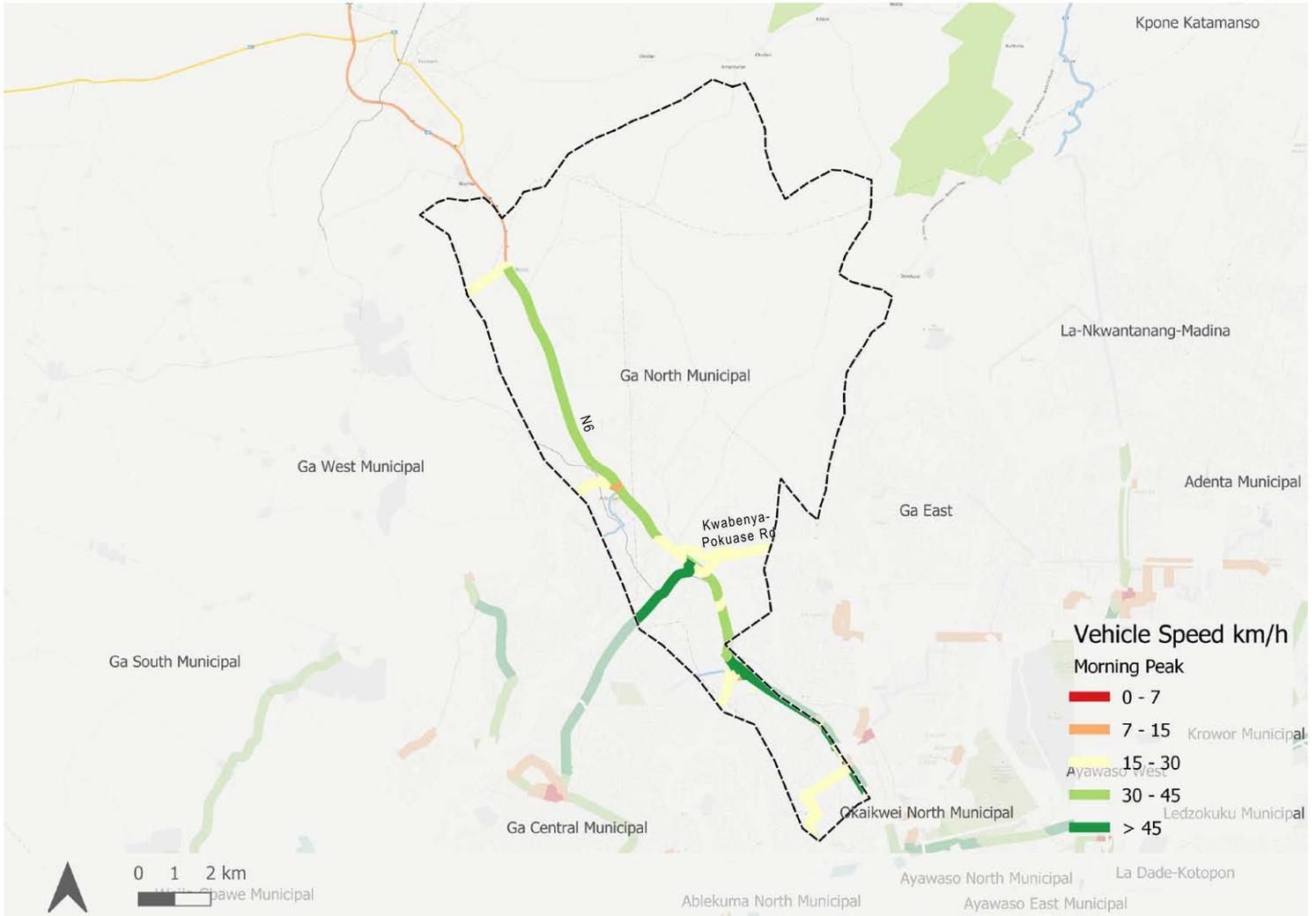
Ga North Municipal



- 12 surveyed routes departing from the Assembly
- 7 surveyed routes with more than 50 daily departures
- High density of stops along the routes within the Assembly (important number of stops per km)
- One main terminal: Amasaman Trotro Station with approx. 2'100 boarding during MPP
- High passenger flows in connection with the terminal on N1 Highway (up to 1'200 pax/hour during MPP)
- No congestion issues (in general vehicle speed during PP greater than 15 km/h)

Ga North Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Amasaman Trotro Station - 37 Station	96	19,9	0,4	22,0	NA	0:50	24	236	5
Amasaman Trotro Station - Ashalaja Station	97	10,2	0,2	17,3	18,9	0:30	11	2568	4
Amasaman Trotro Station - Community 1 (Tema Casino)	24	43,4	0,1	40,2	30,3	1:10	29	501	10
Amasaman Trotro Station - Kasoa	81	28,1	0,3	35,8	25,2	0:55	13	788	6

Ga North Municipal Assembly

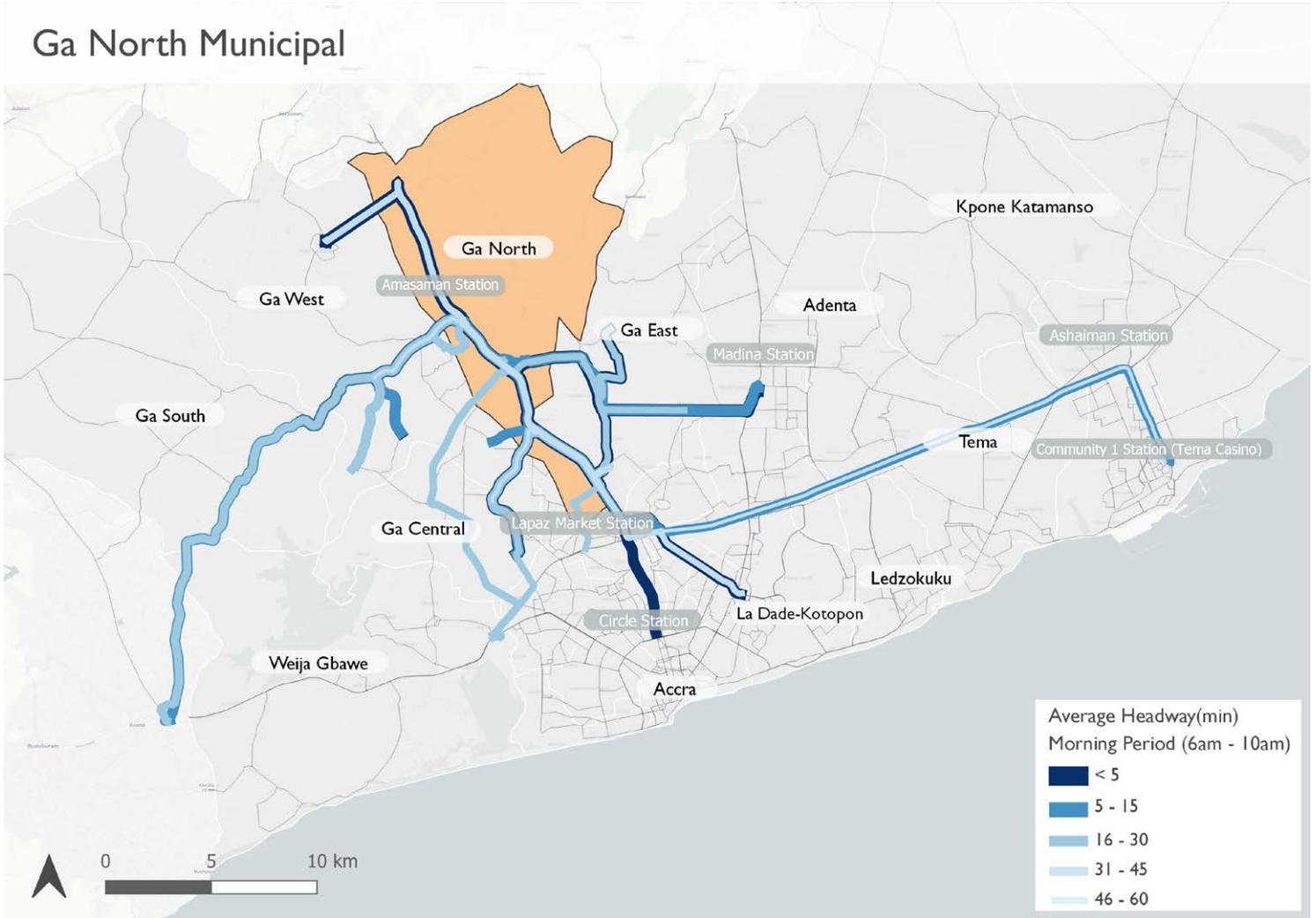
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Amasaman Trotro Station - Kotoku Terminal	33	12,3	0,8	25,7	NA	0:30	8	490	3
Amasaman Trotro Station - Madina Station (Zongo Junction)	67	17,8	0,6	14,2	NA	1:15	7	480	5
Amasaman Trotro Station - Mallam Junction	68	20,1	0,1	25,3	NA	0:40	20	200	7
Amasaman Trotro Station - Manhean	39	10,4	0,2	18,1	19,7	0:35	14	855	5
Amasaman Trotro Station - Nsakina	65	8,7	0,2	18,3	16,1	0:35	10	242	4
Amasaman Trotro Station - Obeyeyie Taxi Station	46	6	0,3	22,2	15,3	0:25	7	602	3
Ofankour Barrier - Santa Maria	25	7,6	1,2	14,6	15,9	0:30	11	560	3
Pokuase Station - Haatso	55	11,3	0,7	12,2	12	0:55	37	168	4

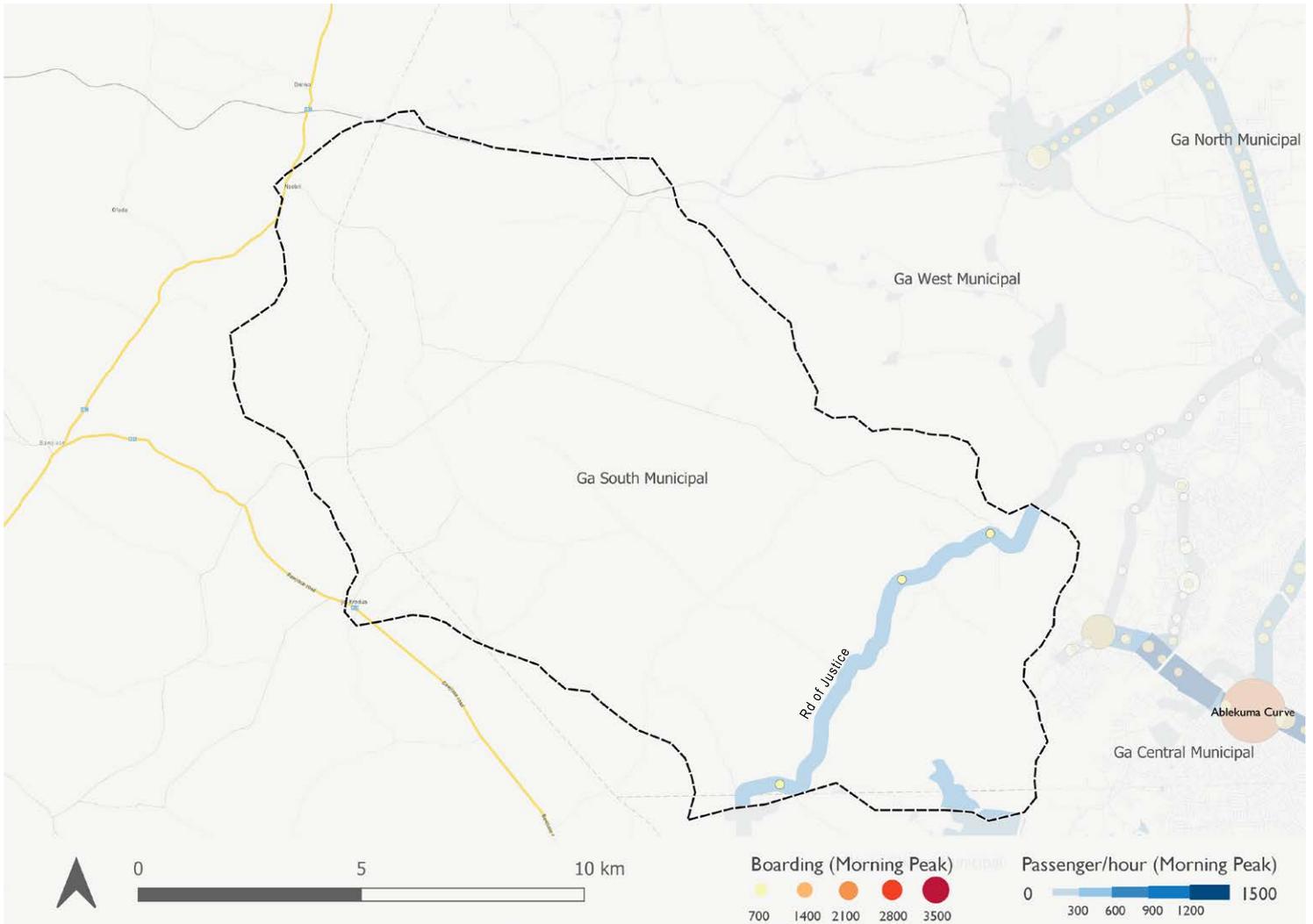
Indicators based on a limited number of observations – average speed may not be representative of typical conditions

Ga North Municipal Assembly

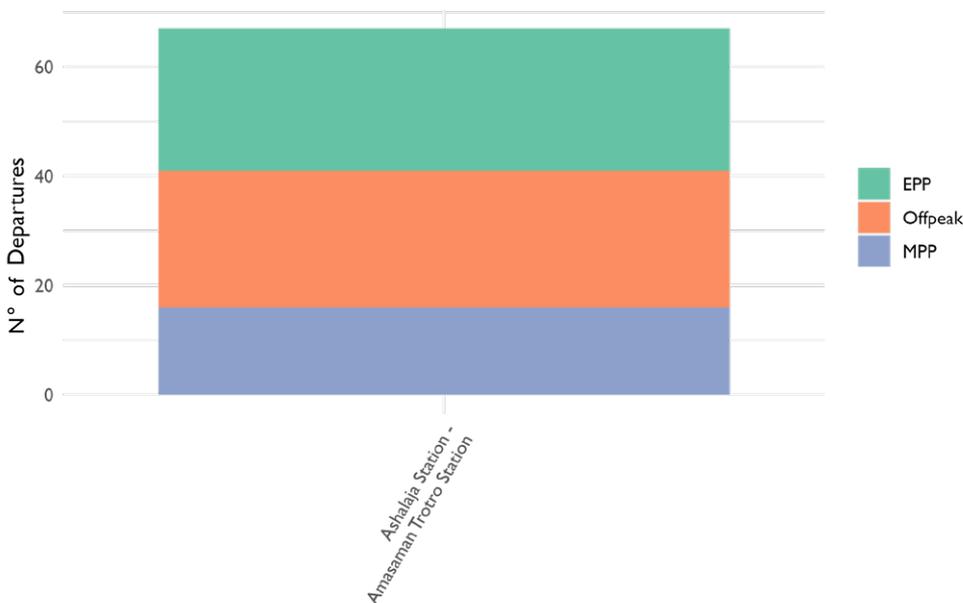
(4/4)



Ga South Municipal District



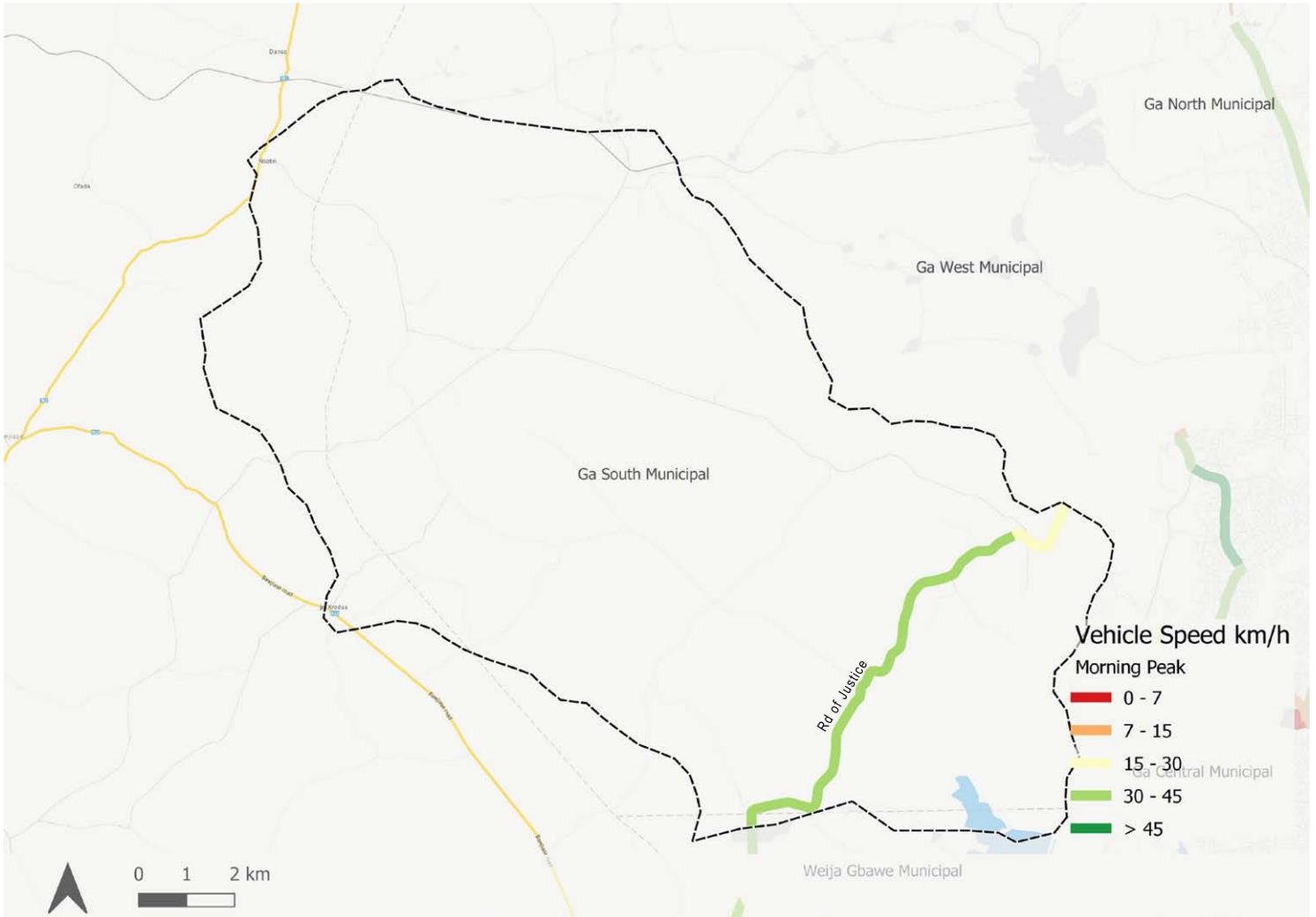
Ga South Municipal



- 1 unique route departing from the Assembly with more than 60 departures a day
- Route transiting through the Assembly with few stops along the route
- Up to 700 boarding per stop during MPP
- Overall homogeneous passenger flows during PP (up to 300 pax/hour during MPP)
- No congestion issues (vehicle speed between 30 and 45 km/h during MPP)

Ga South Municipal District

(2/3)

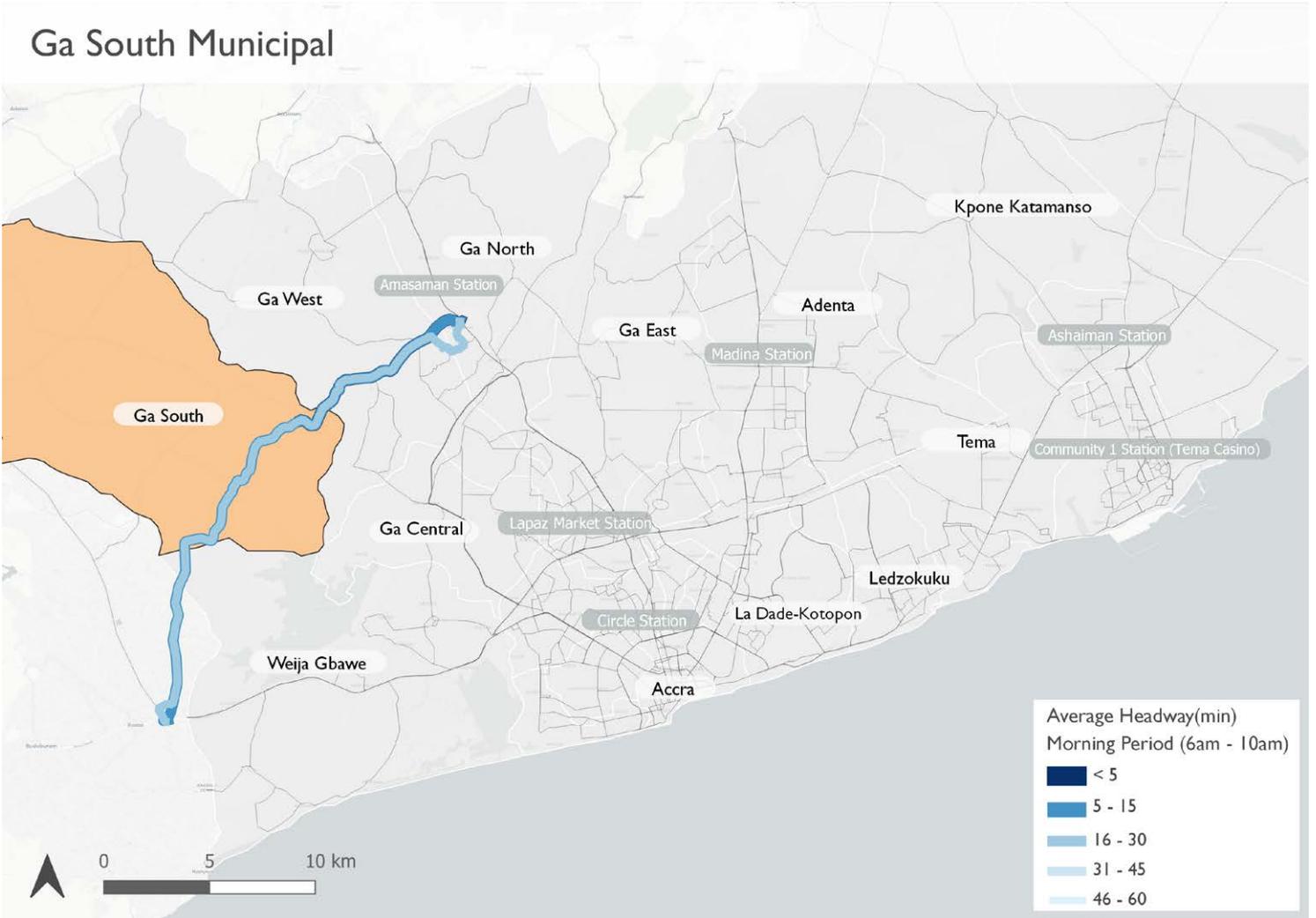


Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Ashalaja Station - Amasaman Trotro Station	67	10,2	0,3	15,7	18,7	00:35	12	114	4

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

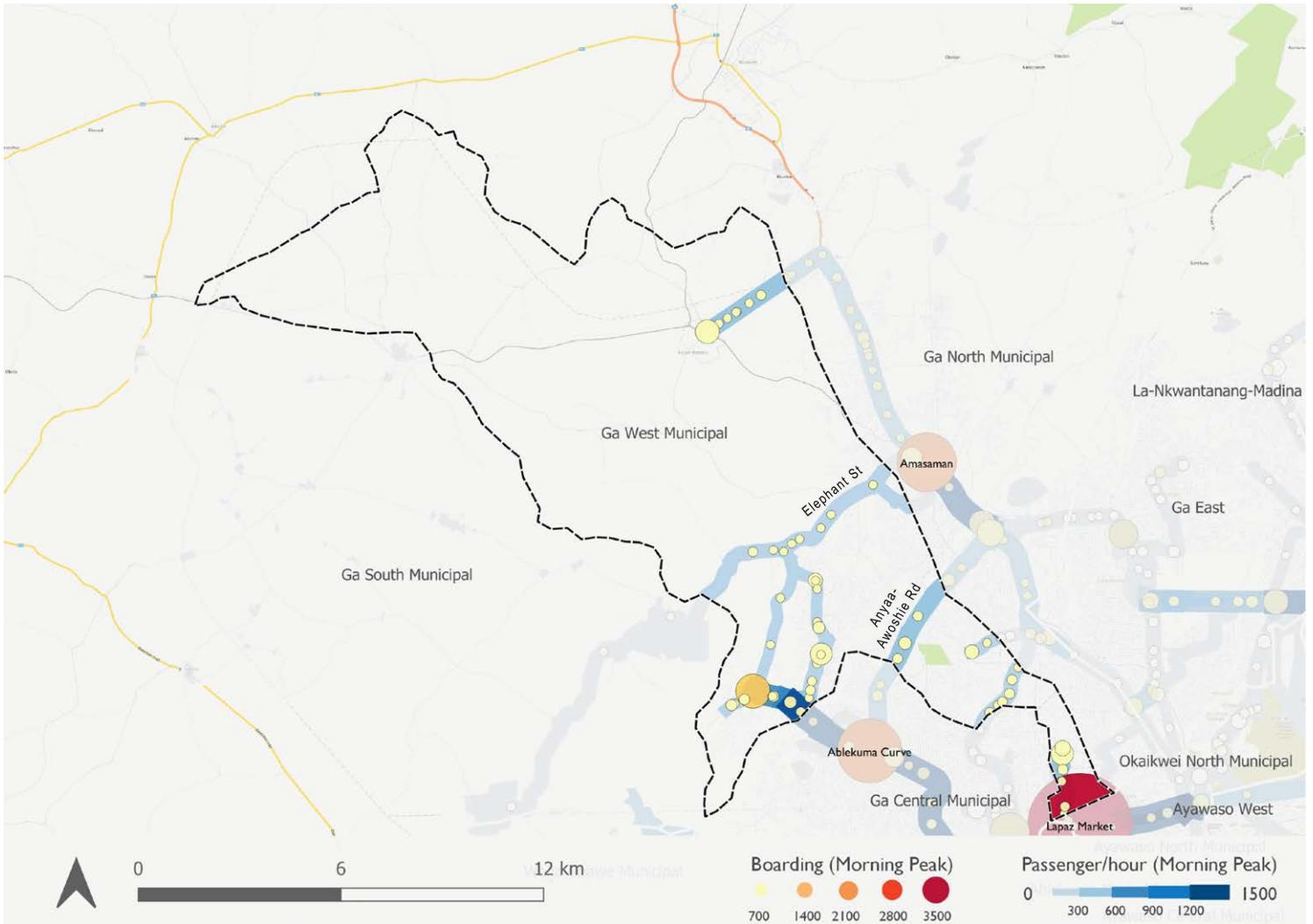
Ga South Municipal District

(3/3)

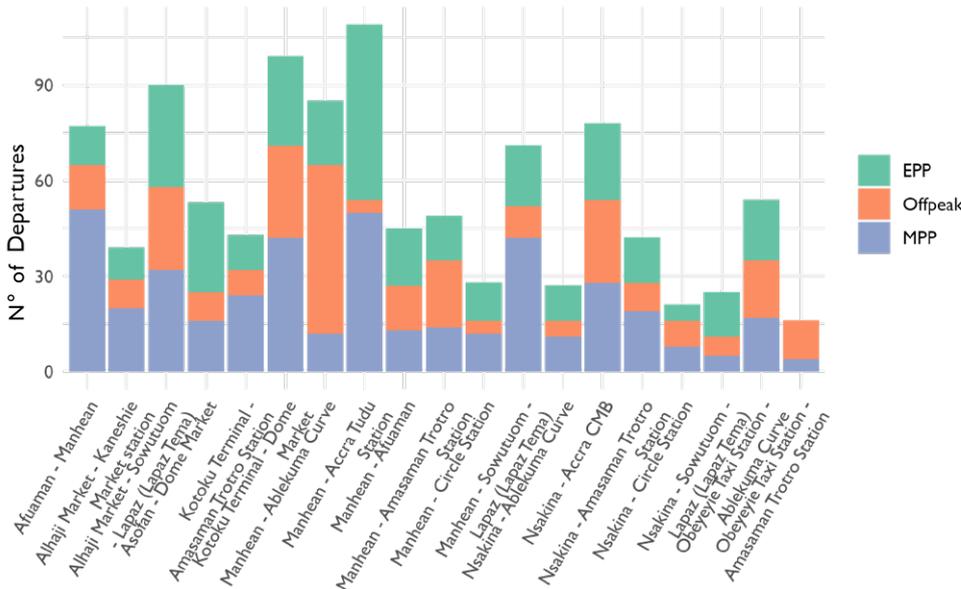


Ga West Municipal Assembly

(1/4)



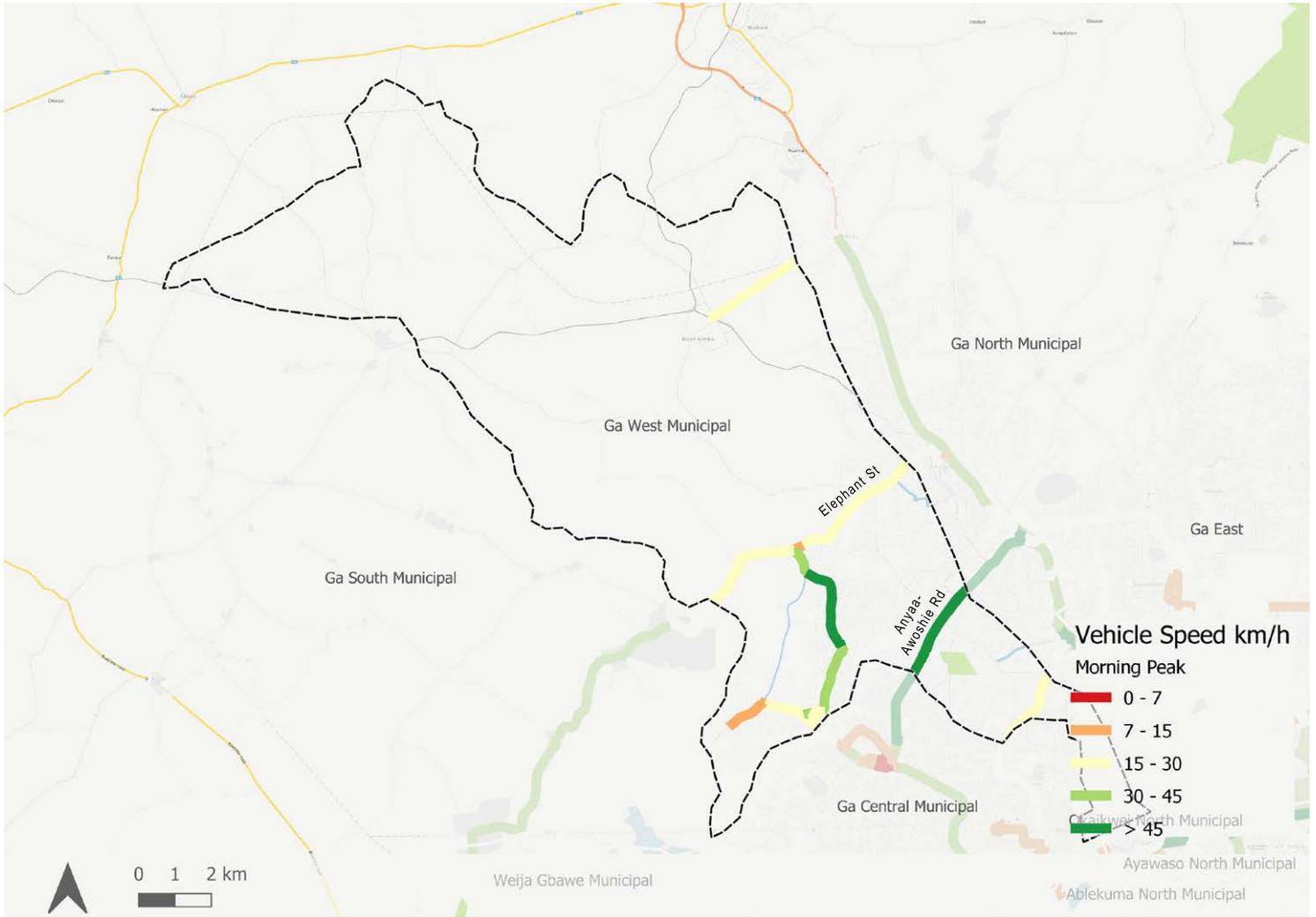
Ga West Municipal



- 19 surveyed routes departing from the Assembly
- 9 surveyed routes with more than 50 daily departures
- High density of stops along the routes within the Assembly (important number of stops per km)
- Up to 2'100 boarding per stop during MPP
- Overall homogeneous passenger flows along the surveyed routes with a greater concentration before Ablekuma Curve terminal (up to 1'200 pax/hour during MPP)
- No major congestion issues despite a few slowdowns along some roads

Ga West Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Afuaman - Manhean	109	1,2	1,7	32,7	4,4	0:10	12	92	1
Alhaji Market - Kaneshie Market station	53	9,5	1,0	12,3	8,7	0:55	19	604	2
Alhaji Market - Sowutuom - Lapaz (Lapaz Tema)	99	4,1	1,2	10,8	17,7	0:20	8	1888	1
Asofan - Dome Market	39	7,5	0,8	12,7	18,5	0:30	12	545	3
Kotoku Terminal - Amasaman Trotro Station	42	11,1	0,5	20,9	NA	0:30	16	83	3

Ga West Municipal Assembly

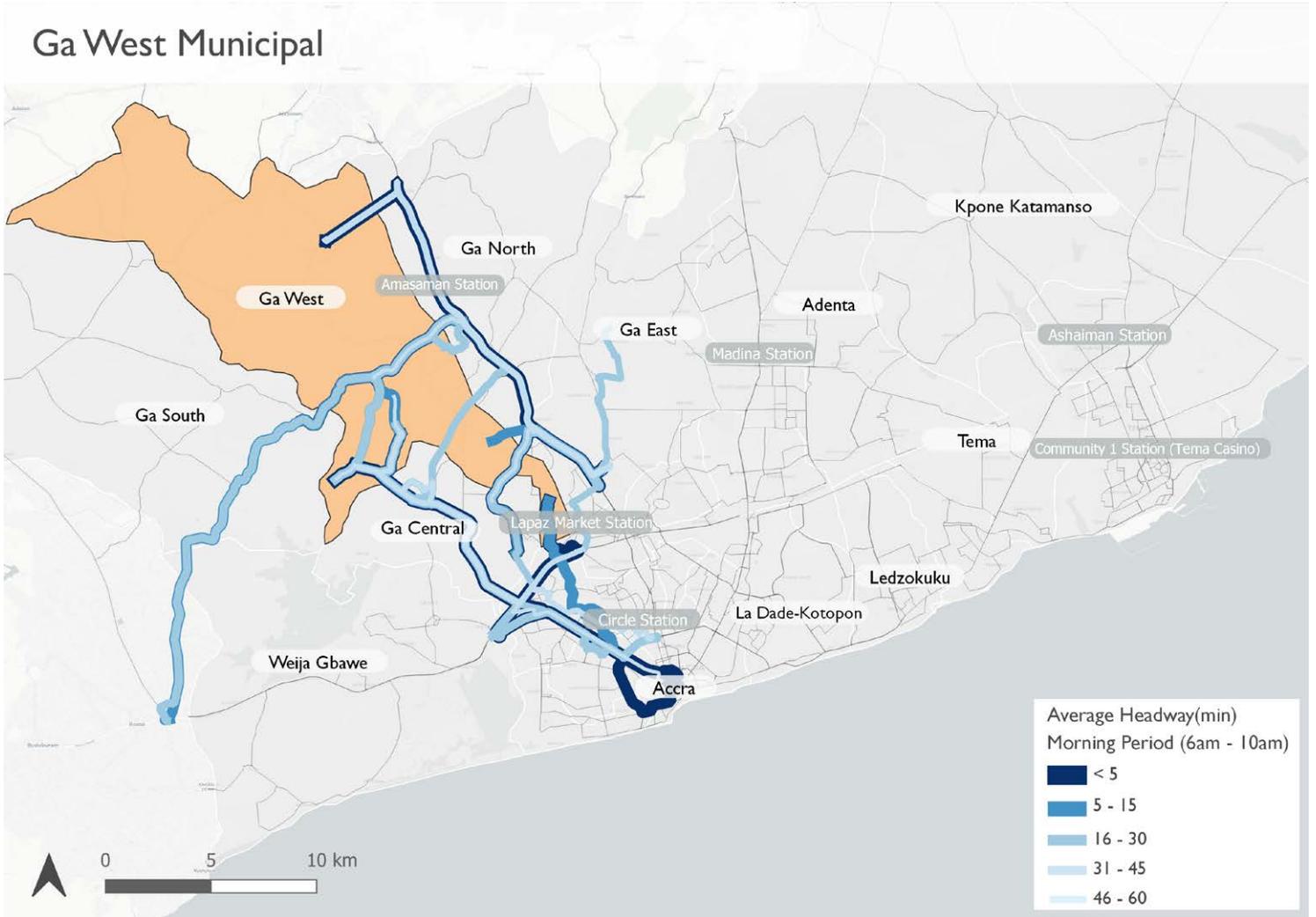
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Kotoku Terminal - Dome Market	77	23	1,0	19,3	22,7	1:05	7	78	4
Manhean - Ablekuma Curve	90	4,5	0,9	14,4	16,9	0:15	16	1004	2
Manhean - Accra Tudu Station	45	20,4	0,6	NA	15,7	1:20	5	72	5
Manhean - Afuaman	71	1,1	0,9	34,7	2,5	0:15	16	1033	1
Manhean - Amasaman Trotro Station	49	10	0,3	NA	16	0:40	17	182	5
Manhean - Circle Station	28	24	0,5	19,1	16,4	1:15	20	516	5
Manhean - Sowutuom - Lapaz (Lapaz Tema)	16	15,1	0,5	17,5	17,8	0:45	9	64	5
Nsakina - Ablekuma Curve	78	5,9	0,9	17,6	14,5	0:20	22	1704	2
Nsakina - Accra CMB	43	25,1	0,5	17,7	16,4	1:30	9	230	5
Nsakina - Amasaman Trotro Station	25	8,8	0,6	13,9	NA	0:40	15	421	4
Nsakina - Circle Station	27	20,7	0,4	14,6	23,1	1:00	38	283	5
Nsakina - Sowutuom - Lapaz (Lapaz Tema)	54	16,8	0,8	19,7	36,5	0:35	31	140	5
Obeyeyie Taxi Station - Ablekuma Curve	85	8,4	0,2	17,7	18,6	0:25	13	1012	4
Obeyeyie Taxi Station - Amasaman Trotro Station	21	5,7	0,3	9,4	12,3	0:30	60	398	3

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

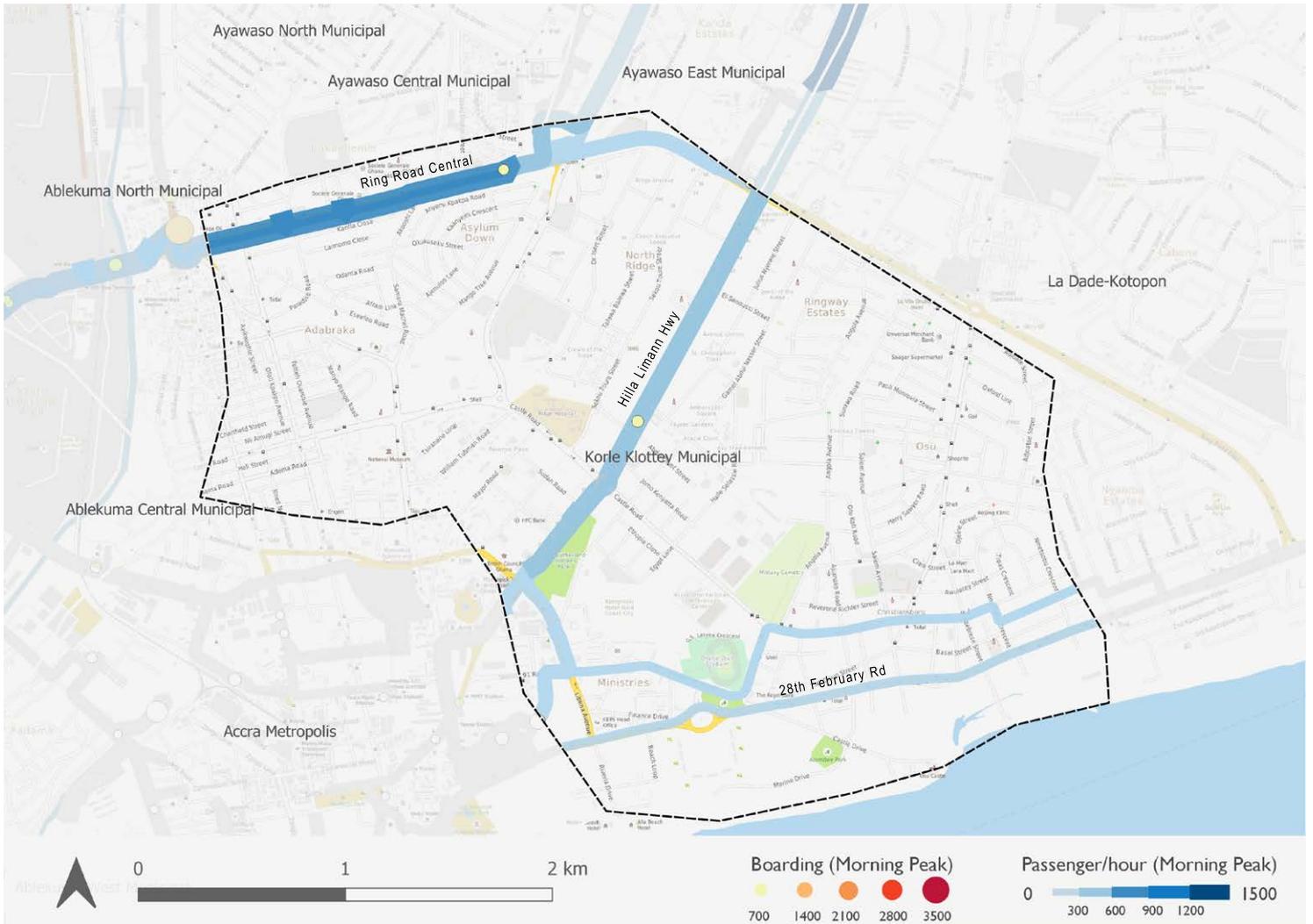
Ga West Municipal Assembly

(4/4)

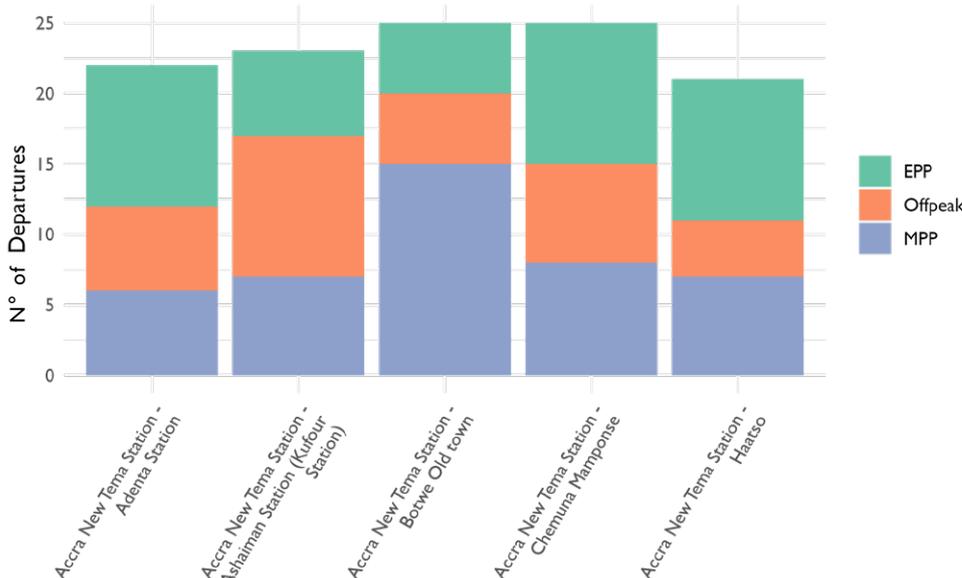


Korle Klottey Municipal Assembly

(1/3)



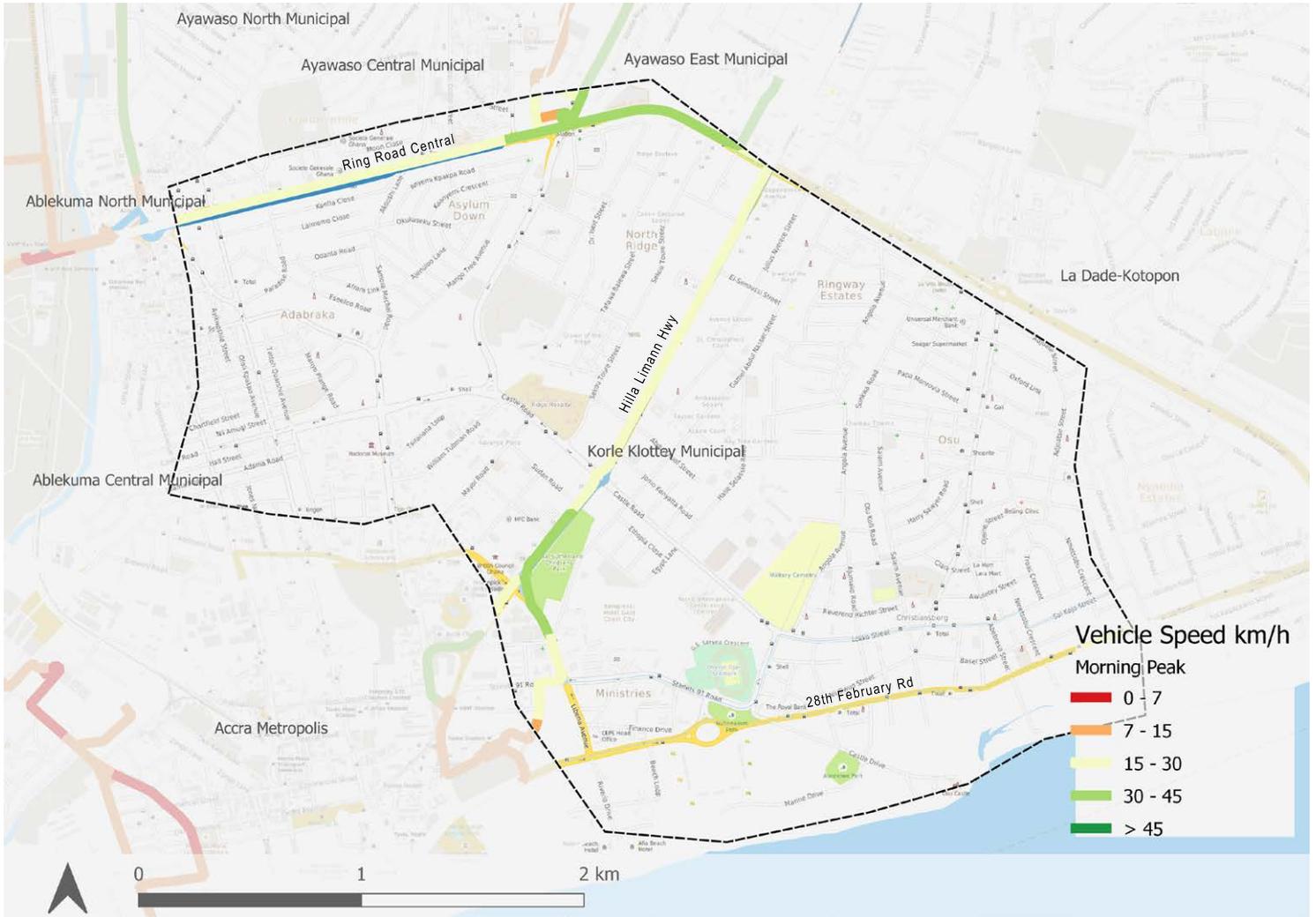
Korle Klottey Municipal



- 5 surveyed routes departing from the Assembly with between 20 and 25 daily departures
- A single stop within the Assembly for the surveyed routes along Hilla Limann Hwy: little possibility for passengers wishing to board in the Assembly
- Overall homogeneous passenger flows along the surveyed routes (up to 600 pax/hour during MPP) with a greater concentration along Ring Road Central (up to 1'200 pax/hour during MPP)
- No congestion issues

Korle Klottey Municipal Assembly

(2/3)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Accra New Tema Station - Adenta Station	25	18,8	0,6	16,8	NA	0:55	33	490	5
Accra New Tema Station - Ashaiman Station (Kufour Station)	25	30	0,1	17,2	32,6	1:10	36	392	8
Accra New Tema Station - Botwe Old town	23	20,9	0,5	10,5	17,8	1:35	30	408	4
Accra New Tema Station - Chemuna Mamponse	21	7,2	1,0	16,0	7,9	0:55	28	637	2
Accra New Tema Station - Haatso	22	17,6	0,9	12,1	12,9	1:40	30	204	4

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

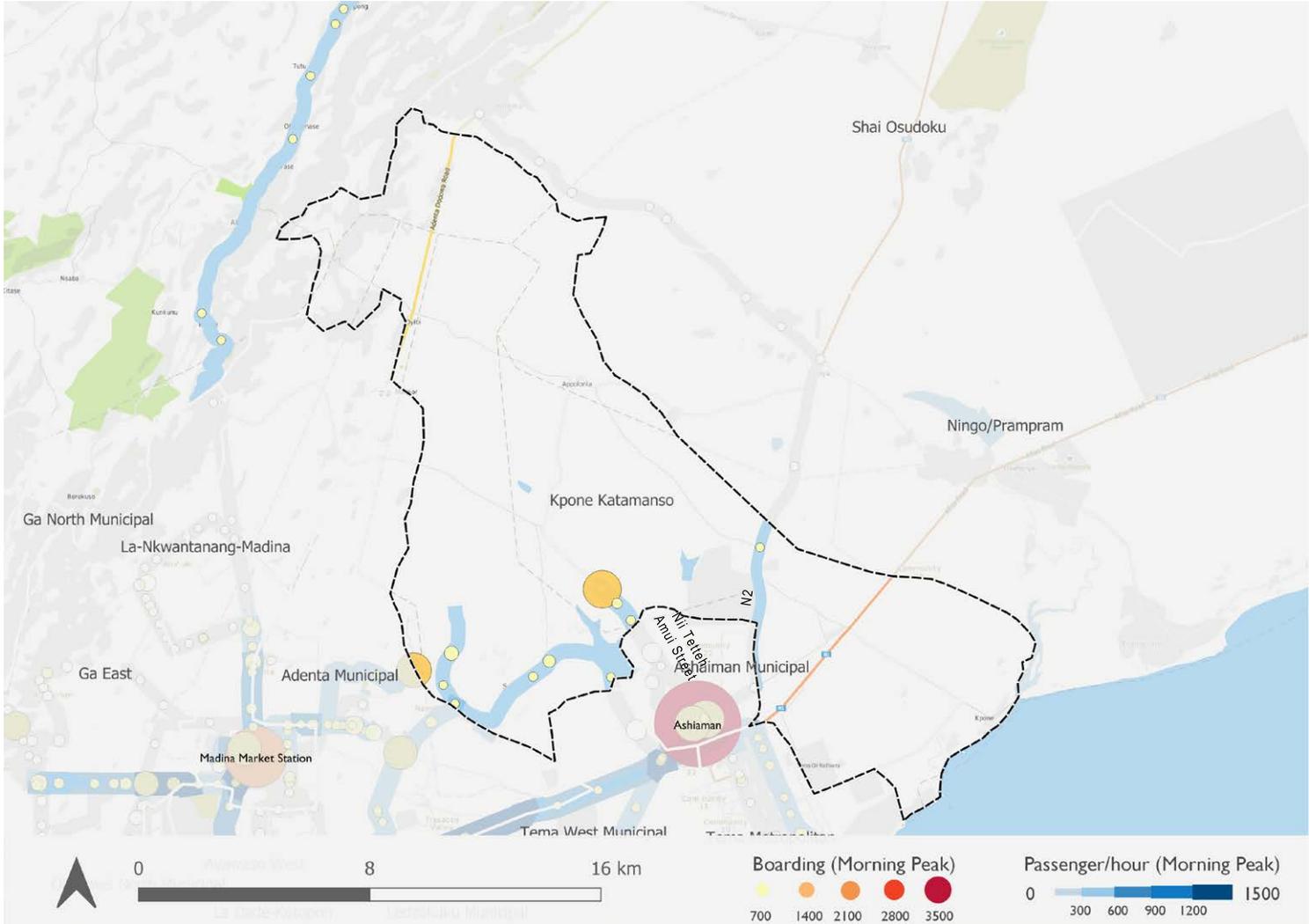
Korle Klottey Municipal Assembly

(3/3)

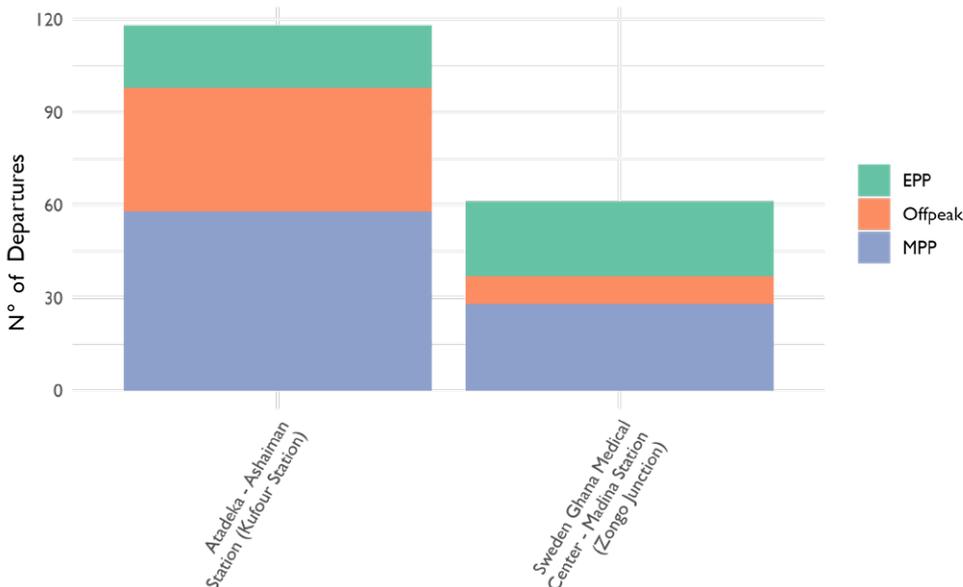
Korle Klottey Municipal



Kpone Katamanso Municipal Assembly

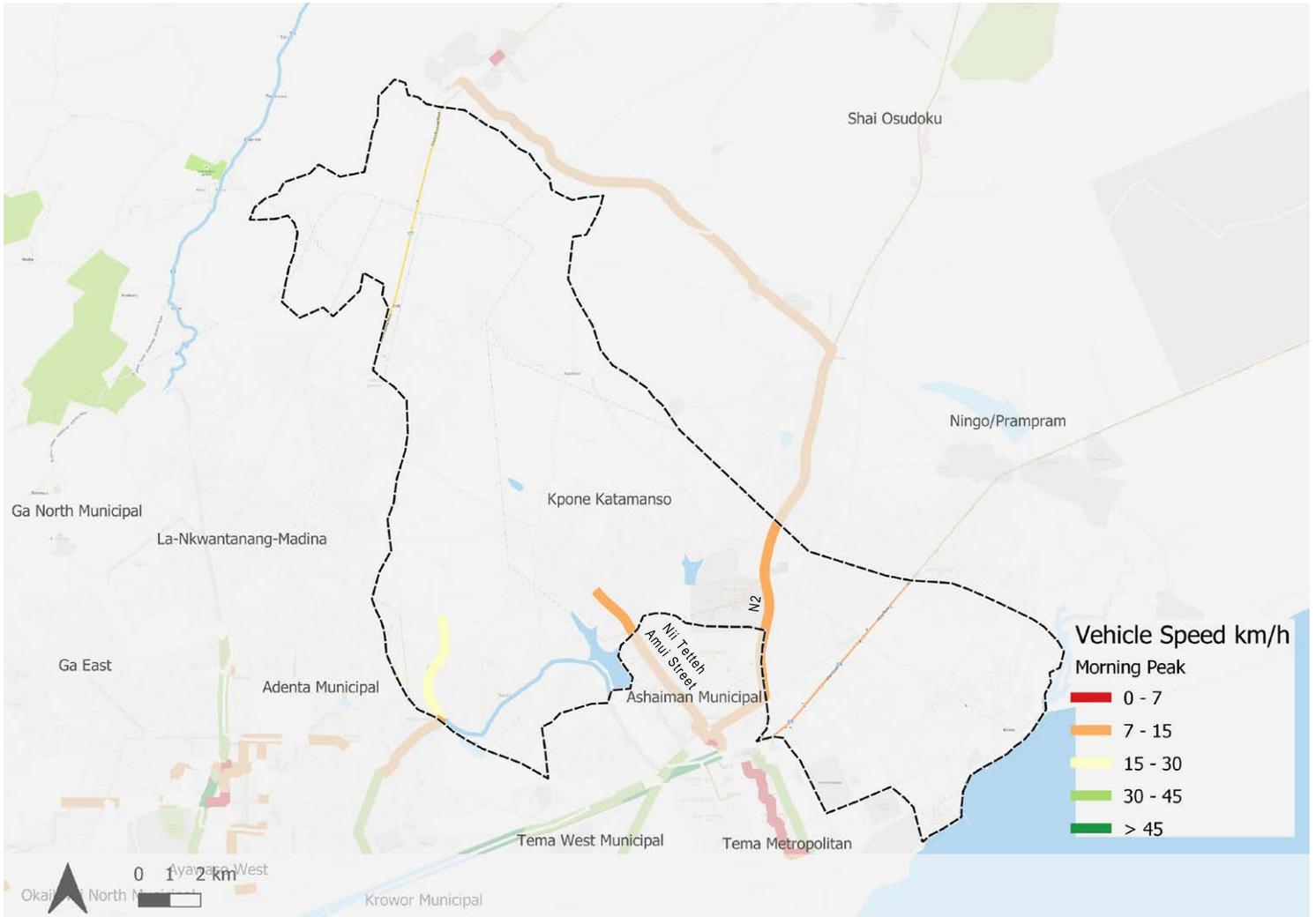


Kpone Katamanso



- 2 surveyed routes departing from the Assembly with up to 120 daily departures
- A relatively good distribution of stops along the surveyed routes
- Up to 1'400 boarding per stop during MPP
- A proximity with Ashiaman terminal (Ashiaman Municipal) registering up to 3'500 boarding during MPP
- Congestion issues with commercial speed between 7 and 15 km/h during MPP along main roads (N2 Highway and Nii Tetteh Amui Street)

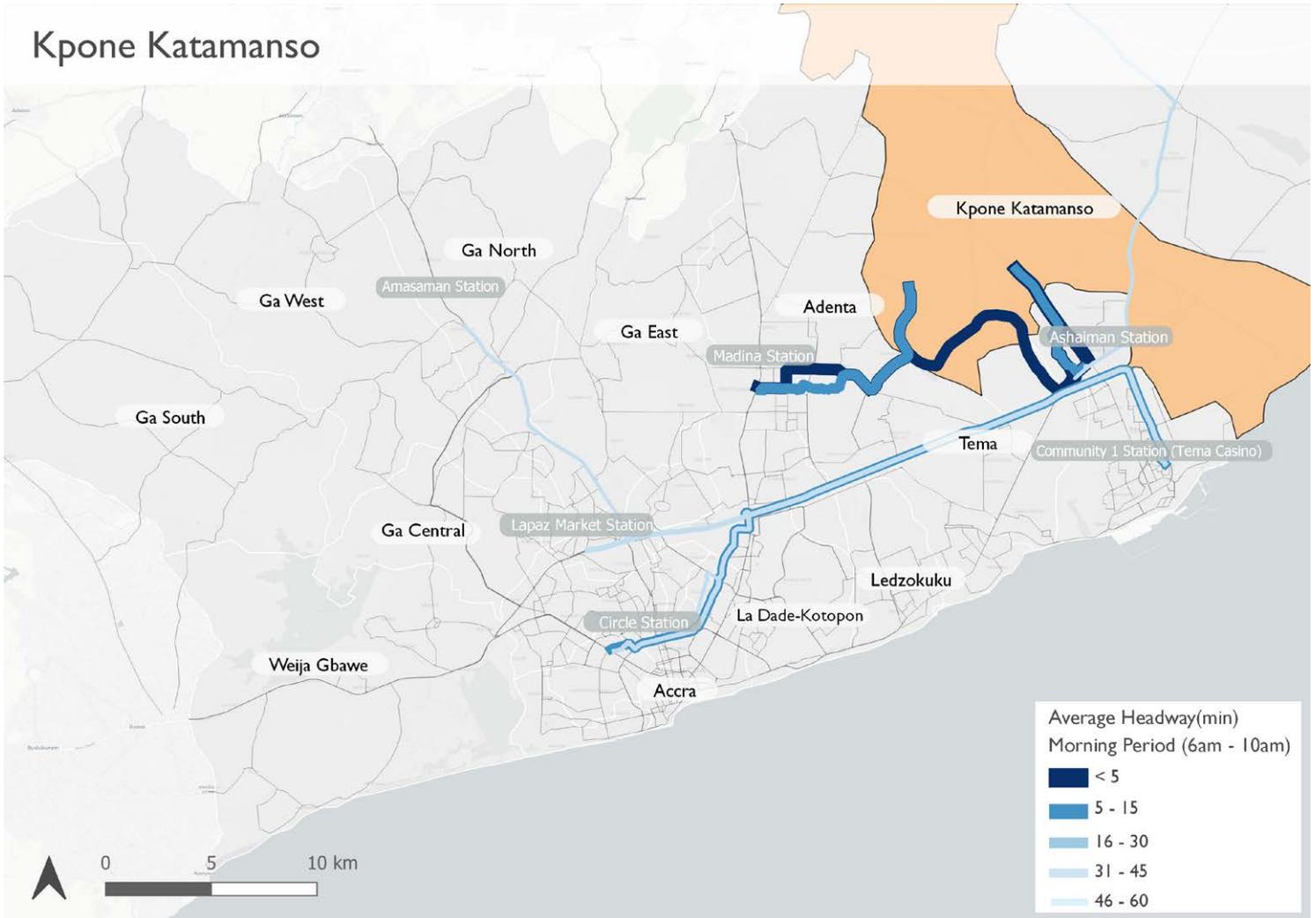
Kpone Katamanso Municipal Assembly



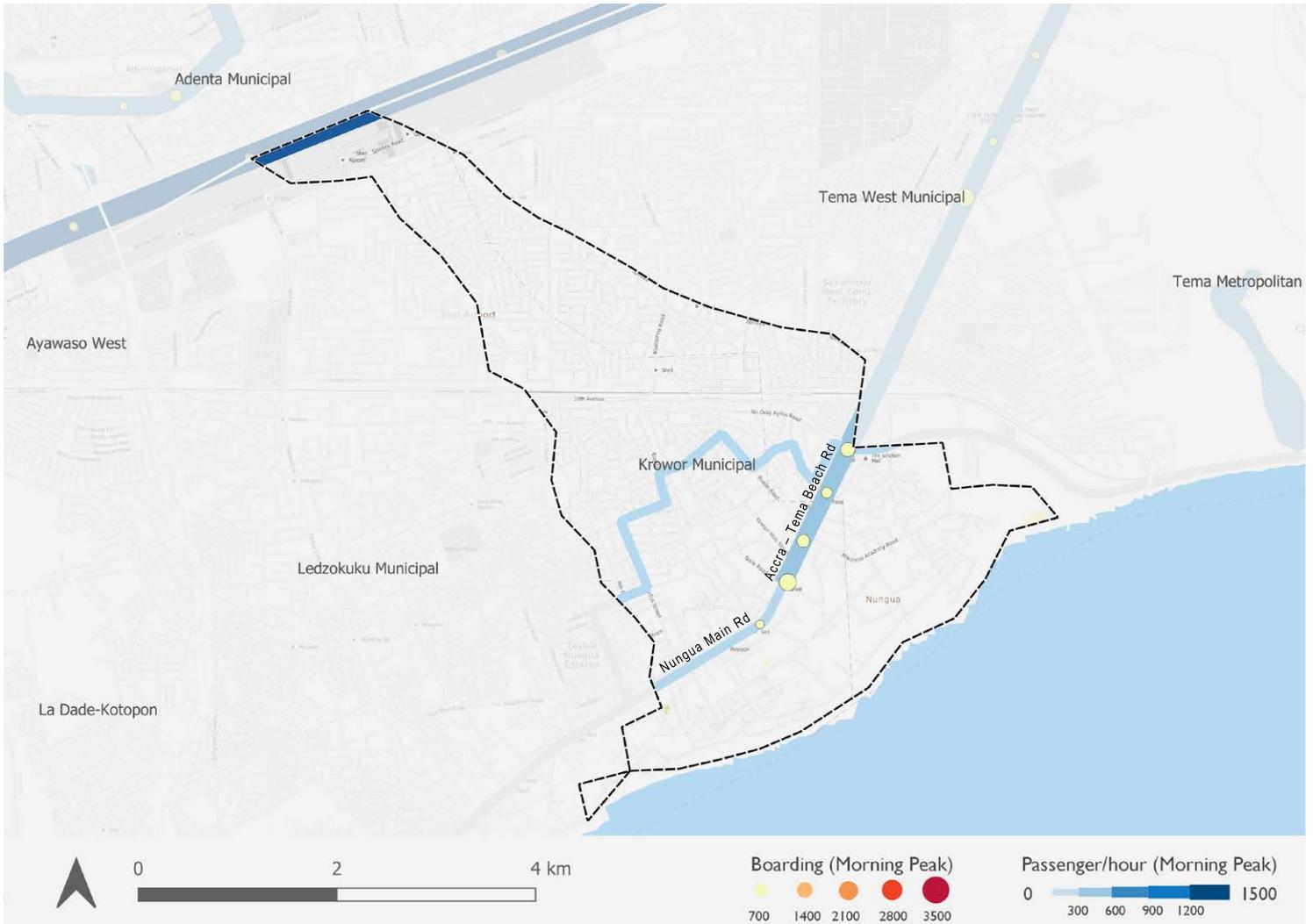
Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Atadeka - Ashaiman Station (Kufour Station)	118	5,5	2,9	8,5	NA	00:30	8	1846	2
Sweden Ghana Medical Center - Madina Station (Zongo Junction)	61	12,8	1,1	11,5	17,8	00:45	9	529	3

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

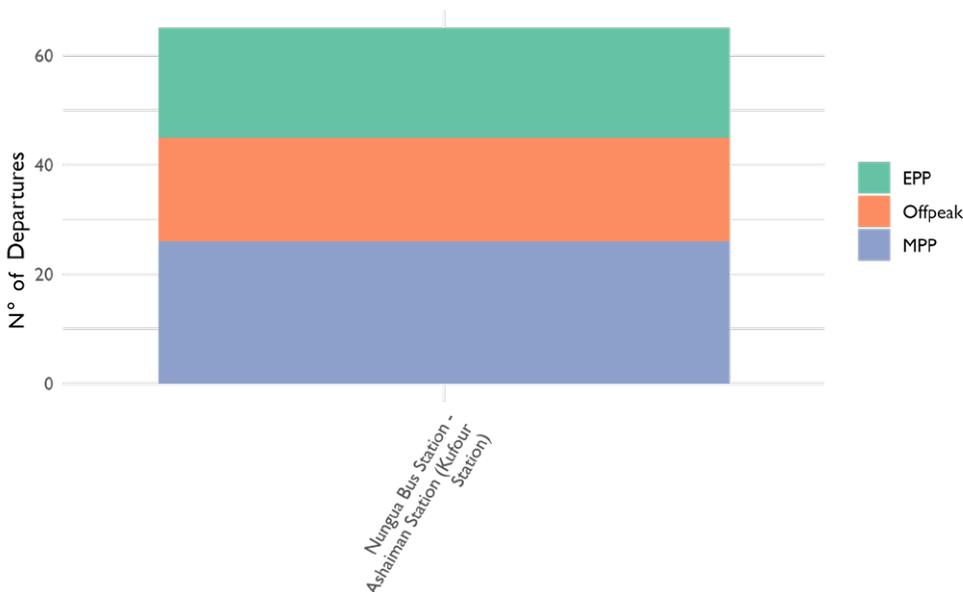
Kpone Katamanso Municipal Assembly



Krowor Municipal Assembly

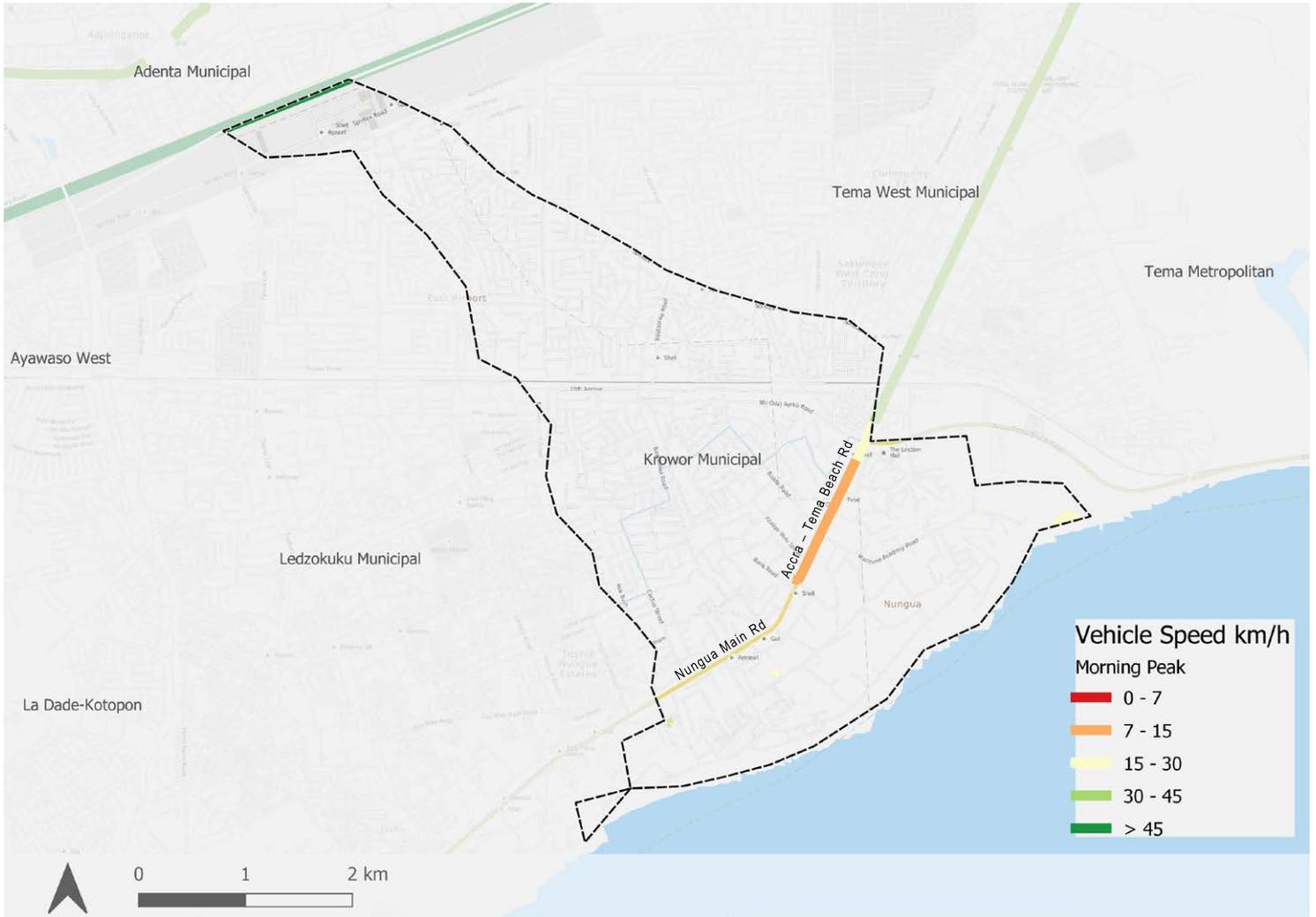


Krowor Municipal



- 1 surveyed route departing from the Assembly with approx. 60 daily departures
- 5 stops within the area with approx. 700 boardings during MPP
- Good distribution of stops along the surveyed routes
- Overall homogeneous passenger flows along the surveyed routes (up to 600 pax/hour during MPP)
- Congestion issues along Accra - Tema Beach Rd with commercial speed during morning peak hour between 7 and 15 km/h during MPP

Krowor Municipal Assembly

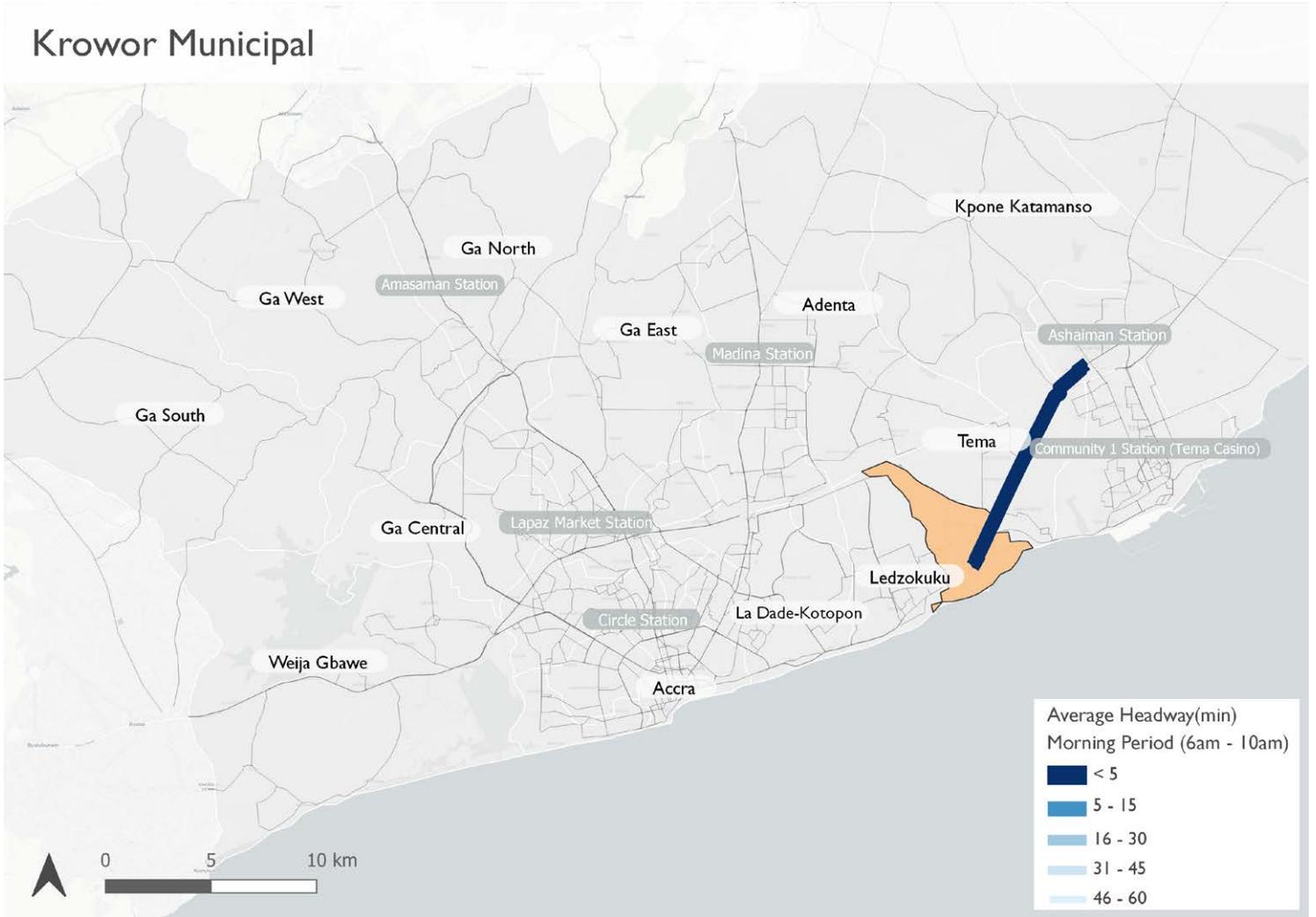


Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Nungua Bus Station - Ashaiman Station (Kufour Station)	65	10,9	1,4	15,1	13,5	00:55	11	1327	3

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

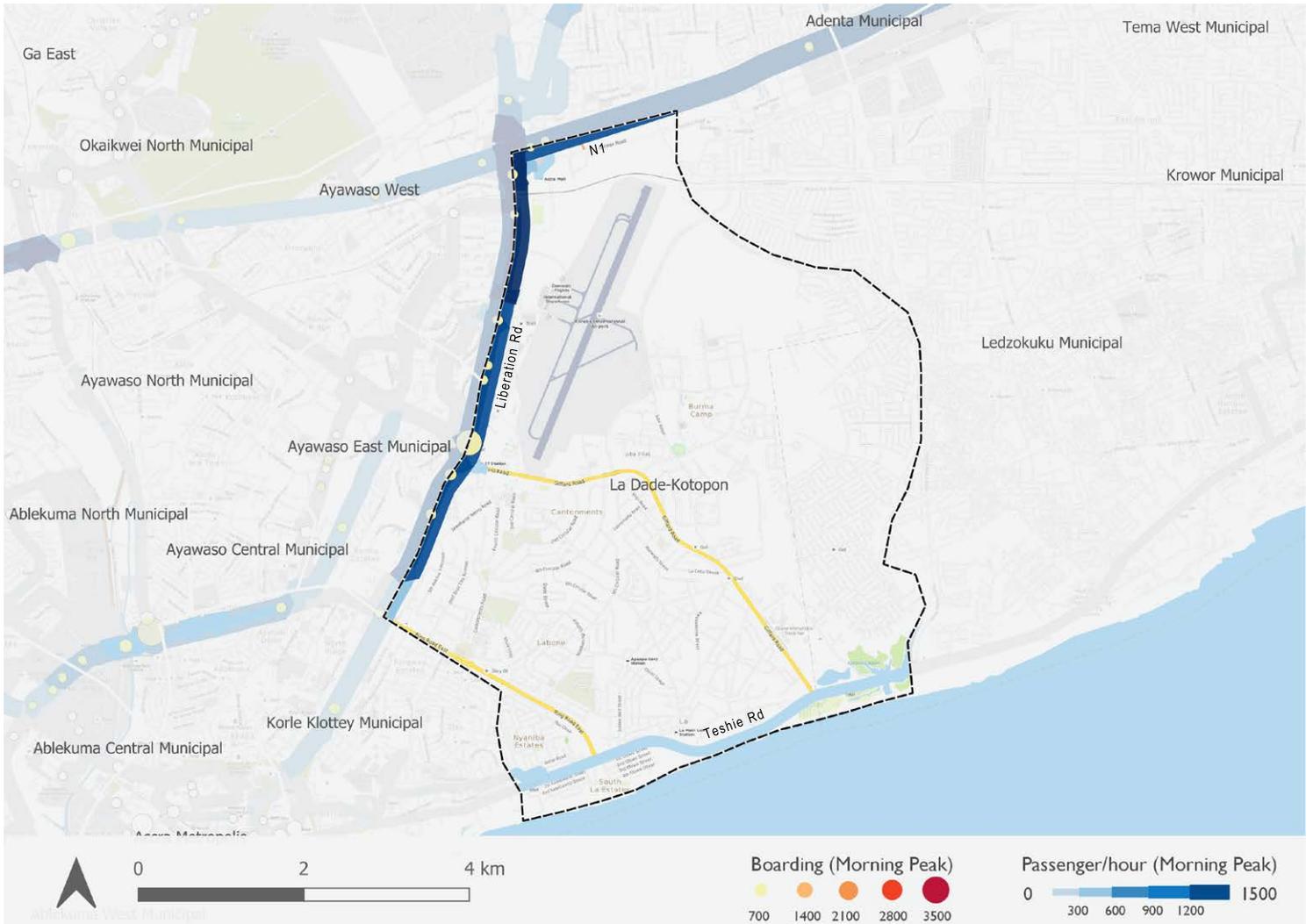
Krowor Municipal Assembly

(3/3)

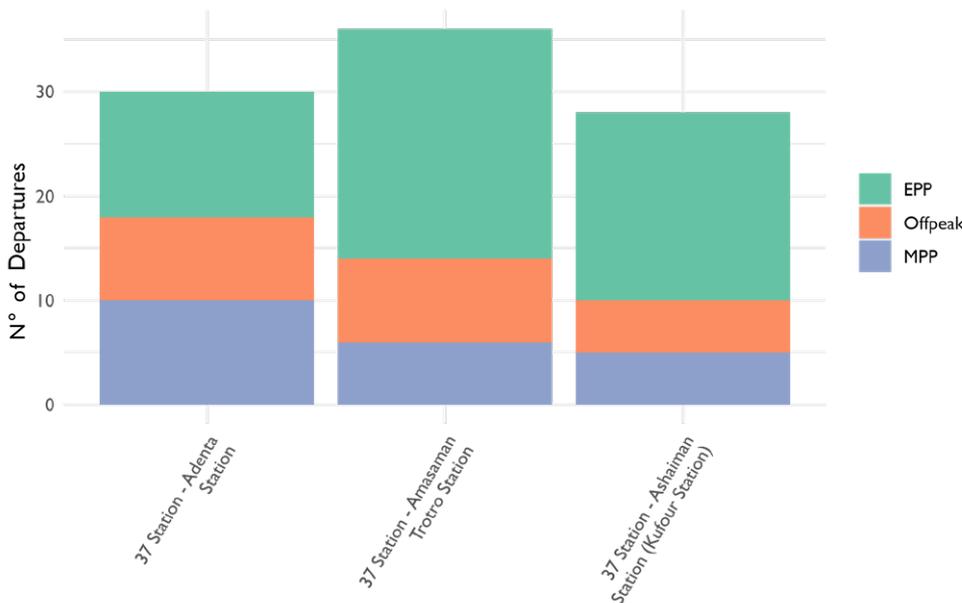


La Dade-Kotopon Municipal Assembly

(1/3)



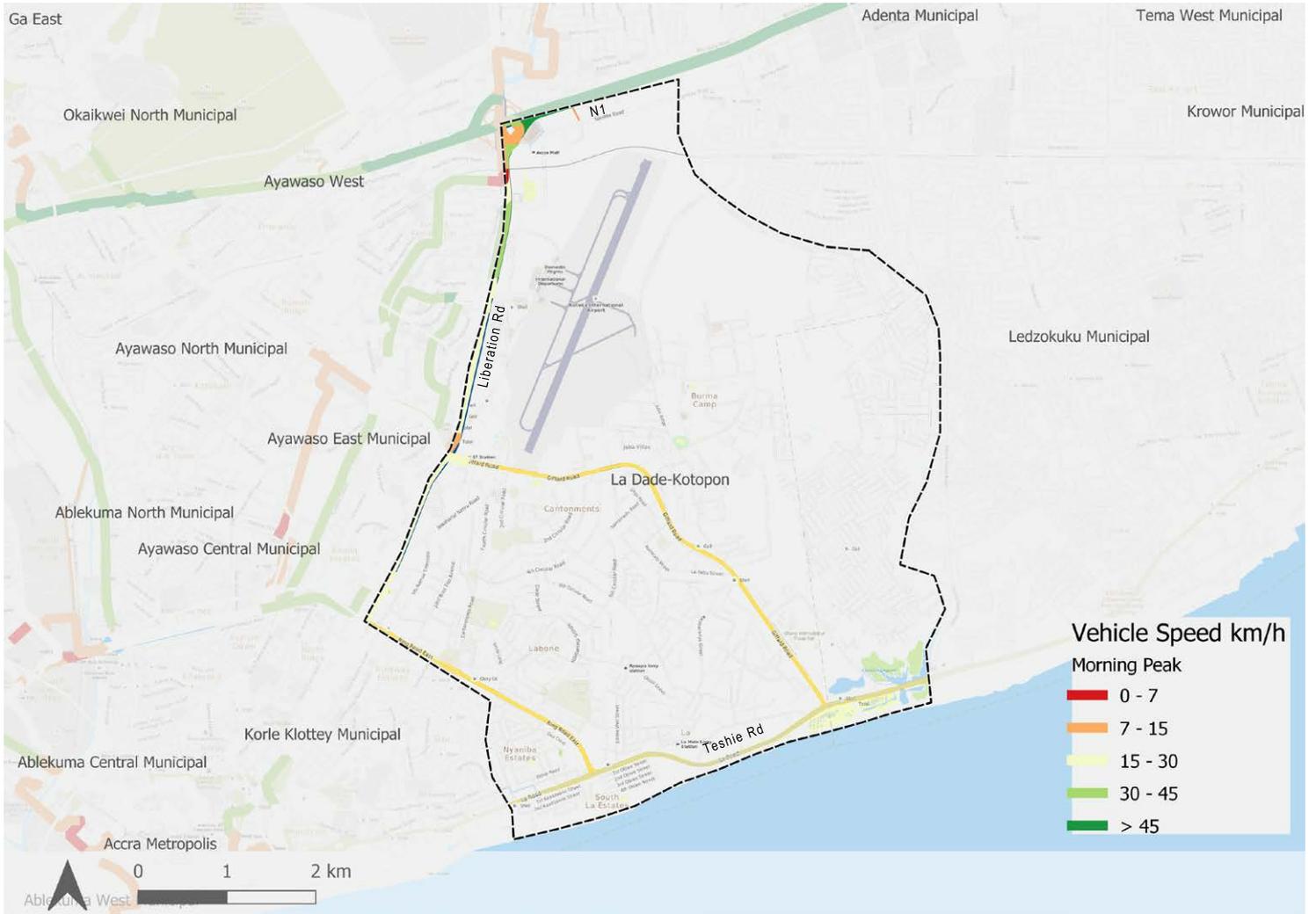
La Dade-Kotopon



- 3 surveyed routes departing from the Assembly with between 30 and 35 daily departures
- Surveyed routes bordering the Assembly
- Important passenger flows during MPP along Liberation Road (up to 1'500 pax/hour)
- No congestion issues during PP

La Dade-Kotopon Municipal Assembly

(2/3)

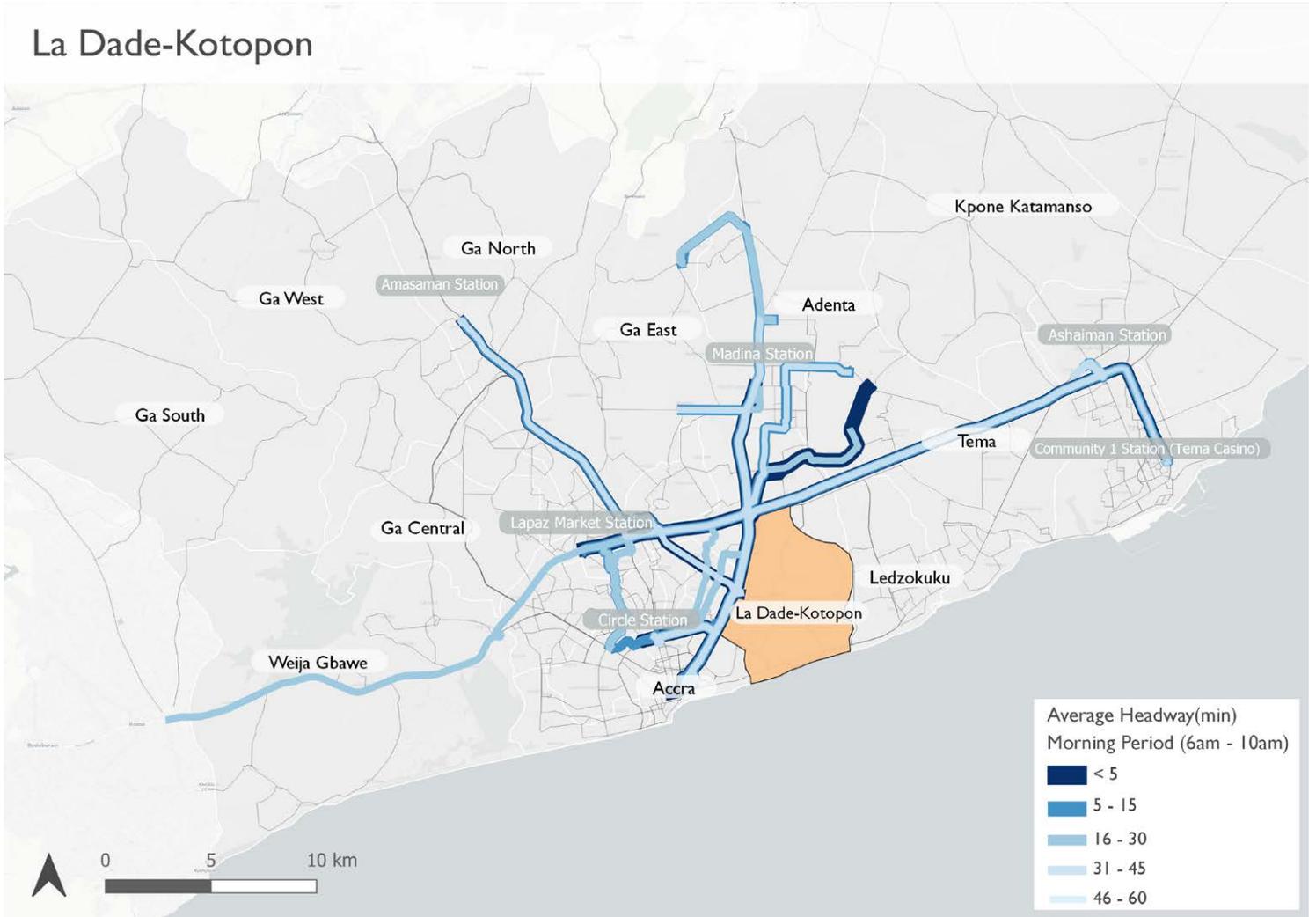


Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
37 Station - Adenta Station	28	14,1	0,1	16,6	19,8	00:45	23	438	4
37 Station - Amasaman Trotro Station	36	20,7	0,2	21,6	22,5	00:55	26	748	5
37 Station - Ashaiman Station (Kufour Station)	30	20	0,2	12,4	20,8	01:15	29	592	6

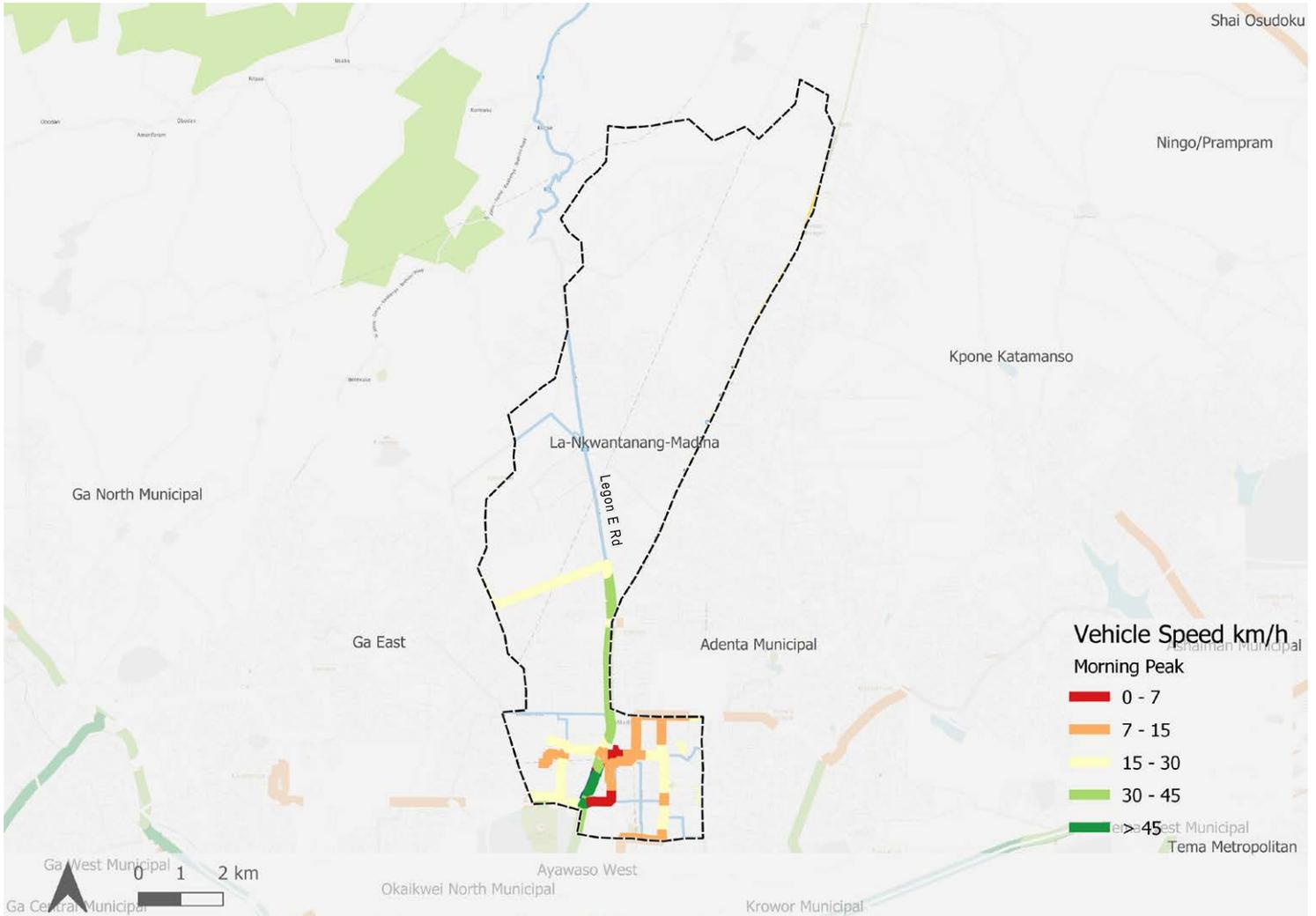
Indicators based on a limited number of observations – average speed may not be representative of typical conditions

La Dade-Kotopon Municipal Assembly

(3/3)



La Nkwantanang Madina Municipal Assembly



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Libya Quarters - Madina Station (Zongo Junction)	40	1,9	1,1	14,2	11,8	0:10	7	573	2
Madina Station (Zongo Junction) - Abokobi Station	34	10,6	1,0	13,9	15,4	0:50	17	78	2
Madina Station (Zongo Junction) - Agbogba	34	4,7	1,1	NA	10	0:30	18	832	2
Madina Station (Zongo Junction) - Akropong	78	40,2	0,2	28,5	27,3	1:25	19	312	8



La Nkwantanang Madina Municipal Assembly

(3/5)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Madina Station (Zongo Junction) - Amasaman Trotro Station	93	18,4	0,3	11,8	17,8	1:35	14	950	5
Madina Station (Zongo Junction) - American house Bus Terminal	34	5,5	0,4	NA	16,6	0:20	9	386	4
Madina Station (Zongo Junction) - Anyaa Market Station (Awoshie Market)	60	22,9	0,4	23,4	13,9	1:15	15	628	5
Madina Station (Zongo Junction) - Ashongman Estates	41	6,3	1,7	5,6	7,7	1:00	23	377	3
Madina Station (Zongo Junction) - Botwe Old town	61	5,5	1,3	9,4	5,3	0:50	22	968	2
Madina Station (Zongo Junction) - Haatso	41	5	0,4	14,5	19,6	0:20	18	954	4
Madina Station (Zongo Junction) - Kasoa	37	37,5	0,3	23,3	22,3	1:30	21	511	8
Madina Station (Zongo Junction) - Kwabenya Bus Terminal	37	11,3	0,5	11,6	11,3	1:00	18	309	3
Madina Station (Zongo Junction) - Lakeside	43	5,8	0,5	12,7	10,3	0:30	11	576	3
Madina Station (Zongo Junction) - Libya Quarters	43	1	1,9	16,2	3,7	0:10	7	746	2
Madina Station (Zongo Junction) - Makola Market No 2 Station	44	16	0,6	29,0	NA	0:35	6	582	4



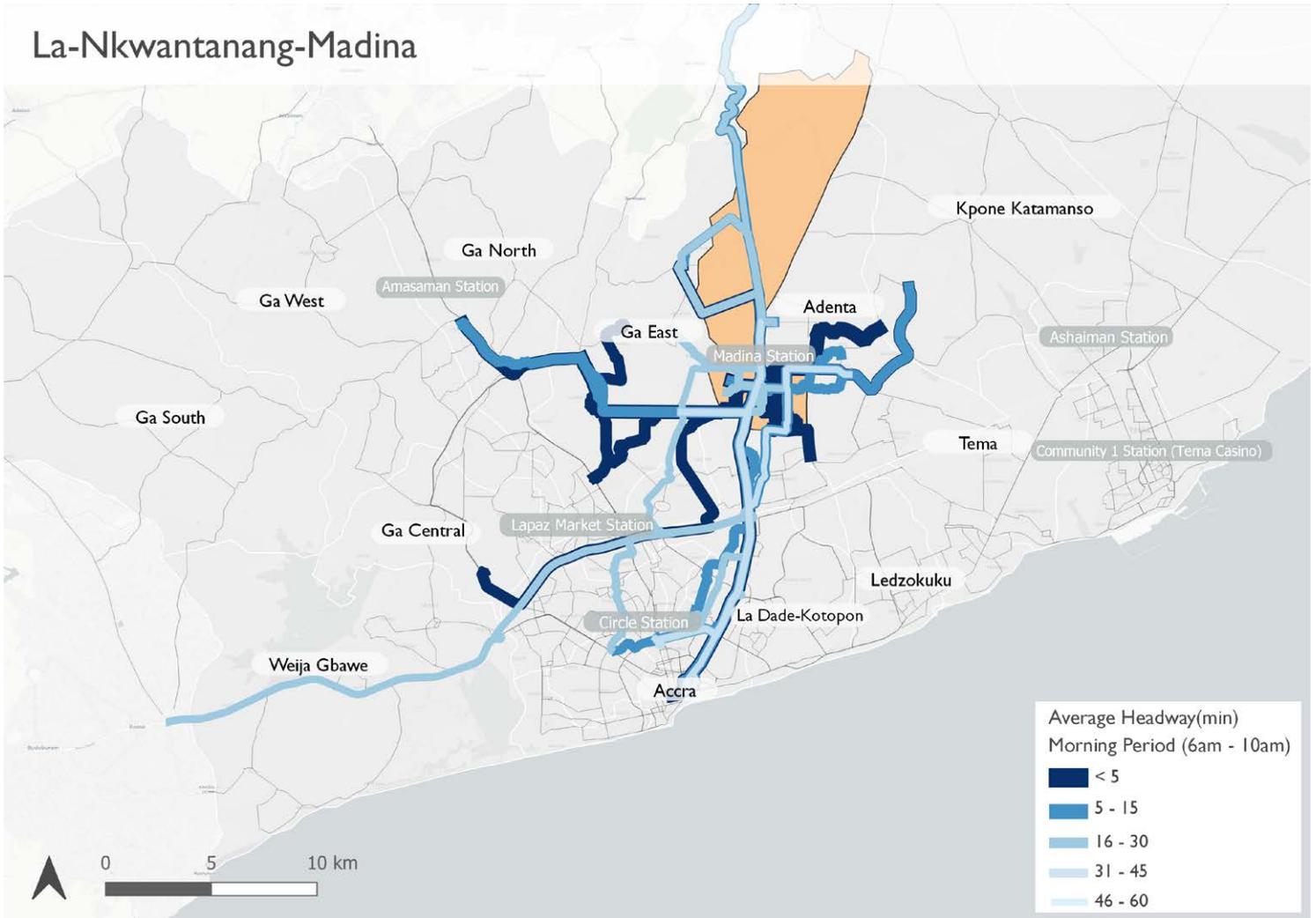
La Nkwantanang Madina Municipal Assembly

(4/5)

Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Madina Station (Zongo Junction) - Nima	51	14,1	0,9	NA	9,6	1:30	28	192	4
Madina Station (Zongo Junction) - Pantang Hospital Junction	81	5	0,8	9,5	12	0:25	20	200	2
Madina Station (Zongo Junction) - St. Johns trotro station	39	11,9	1,0	10,5	14,8	1:05	13	574	4
Madina Station (Zongo Junction) - Sweden Ghana Medical Center	45	13,7	0,7	11,9	8,5	1:25	19	885	3
Madina Station (Zongo Junction) - UN Terminal	98	1,3	1,6	10,4	7,2	0:10	8	359	2
Madina Station (Zongo Junction) - UPS	45	2,9	0,7	NA	14,3	0:10	5	609	2
Madina Station (Zongo Junction) - Washington	60	1,8	1,1	10,1	7,9	0:10	16	564	2
Pantang Hospital Junction - Madina Station (Zongo Junction)	138	4,6	0,9	15,3	5,9	0:35	10	534	2
UN Terminal - Madina Station (Zongo Junction)	86	1,3	0,8	10,7	13	0:05	4	276	2
Washington - Madina Station (Zongo Junction)	122	1,7	1,2	10,2	10,6	0:10	10	304	2

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

La Nkwantanang Madina Municipal Assembly



Ledzokuku Municipal Assembly

(1/2)

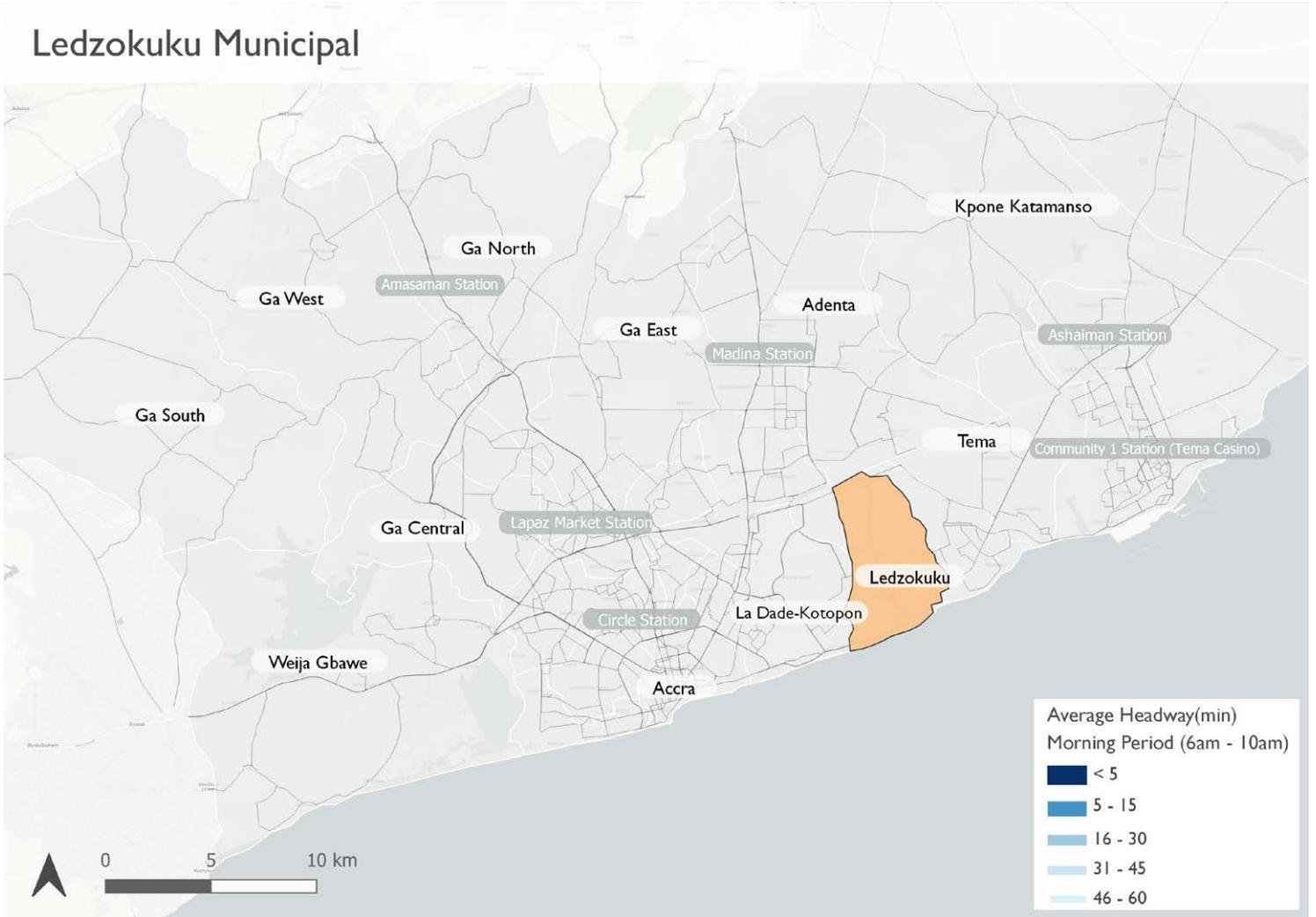


- No terminals or stops in the Assembly for the surveyed routes: routes transiting the Assembly with no possibility to board within the Assembly
- Up to 600 pax/hour during MPP along the surveyed routes
- No congestion issues during PP



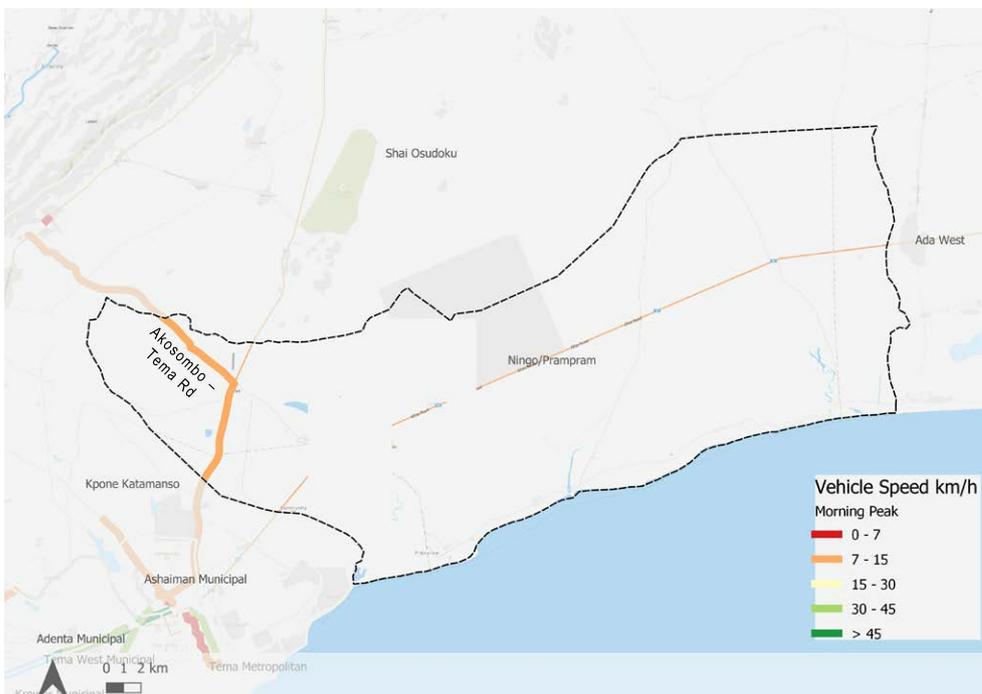
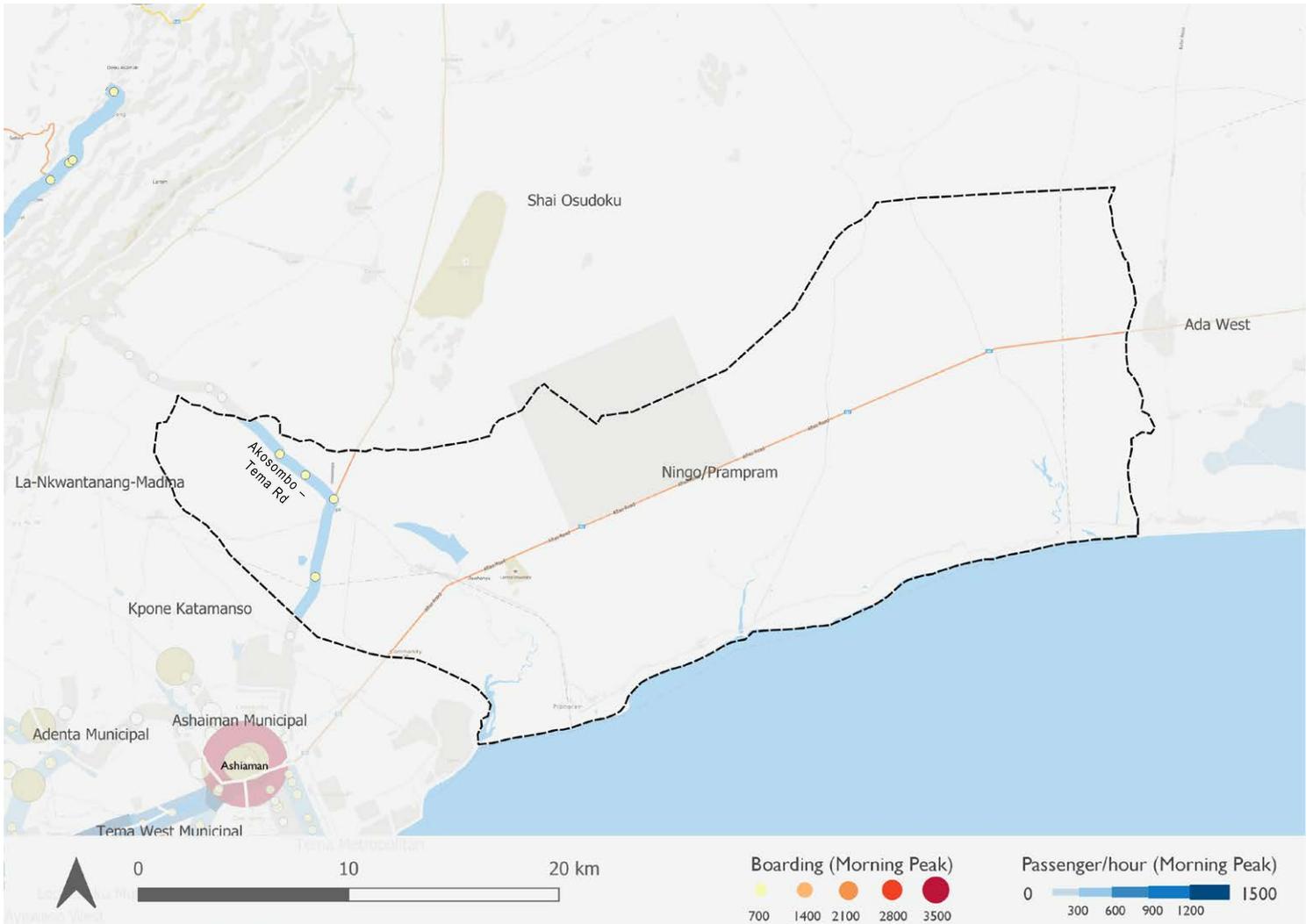
Ledzokuku Municipal Assembly

(2/2)



Ningo Prampram District Assembly

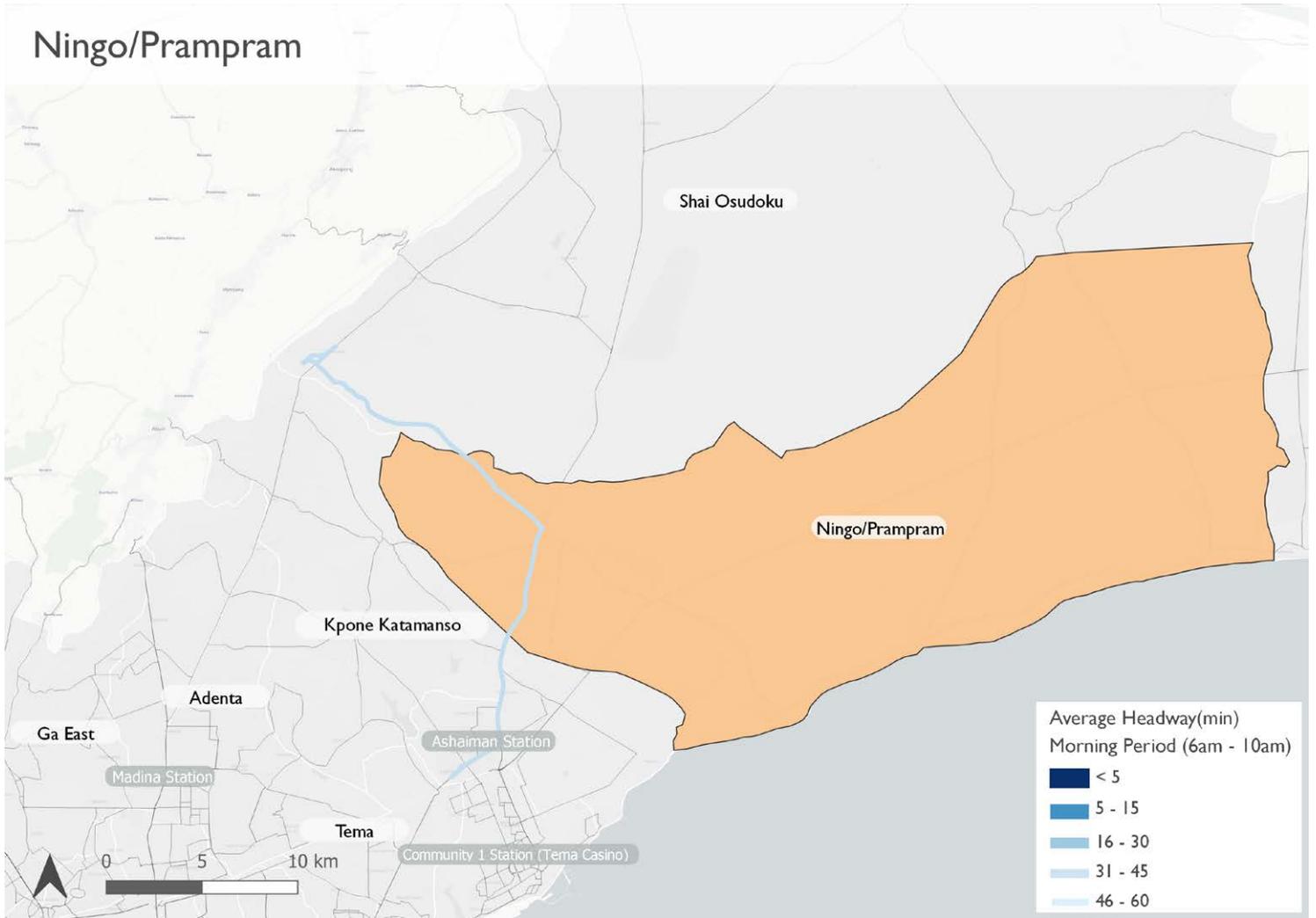
(1/2)



- No terminals in the Assembly for the surveyed routes: routes transiting the Assembly
- Good distribution of stops along the surveyed routes with 4 stops registering approx. 700 boarding during MPP
- Up to 600 pax/hour during MPP along the surveyed routes
- Congestion issues along Akosombo – Tema Rd (vehicle speed between 7 and 15 km/h during MPP)

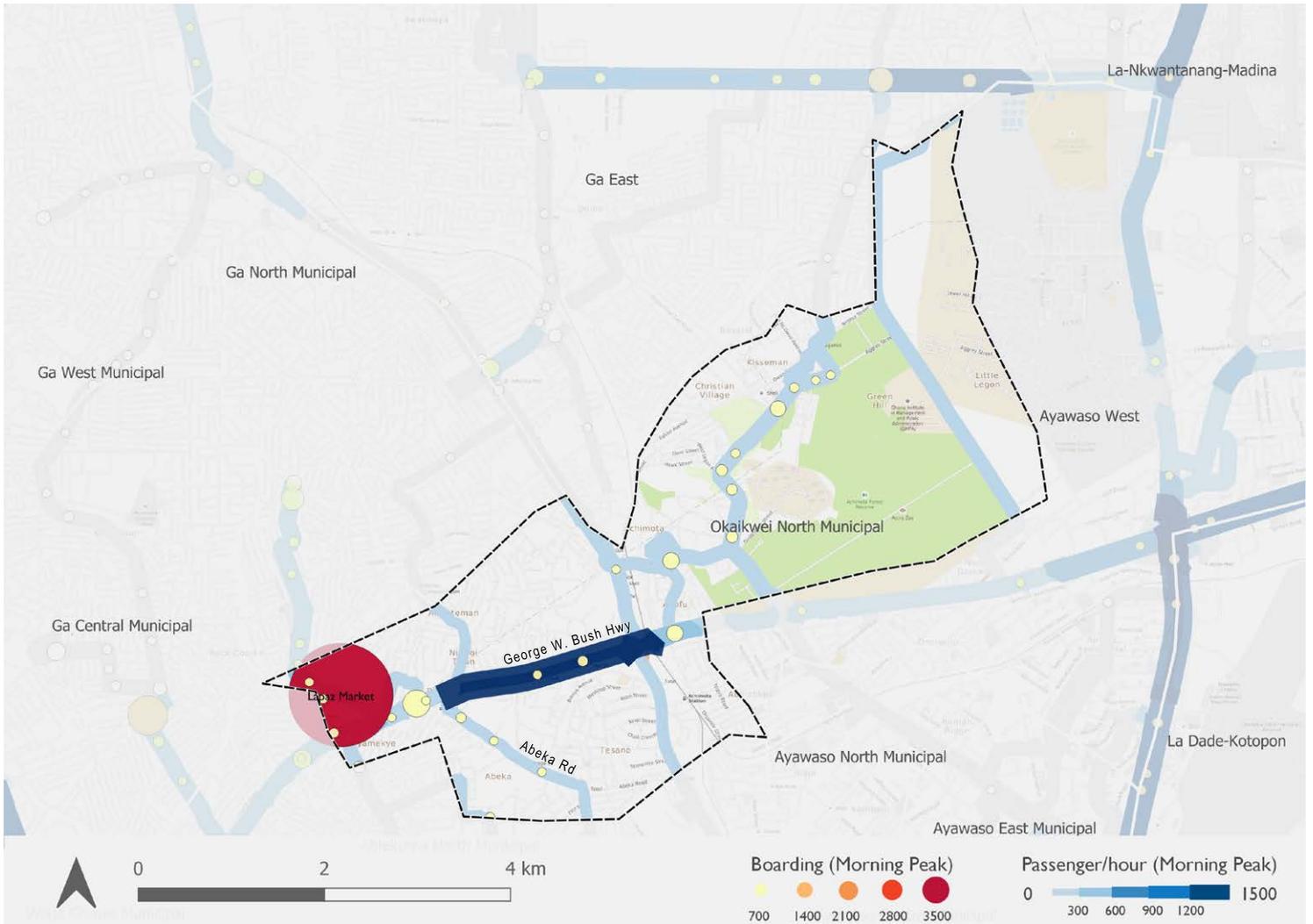
Ningo Prampram District Assembly

(2/2)

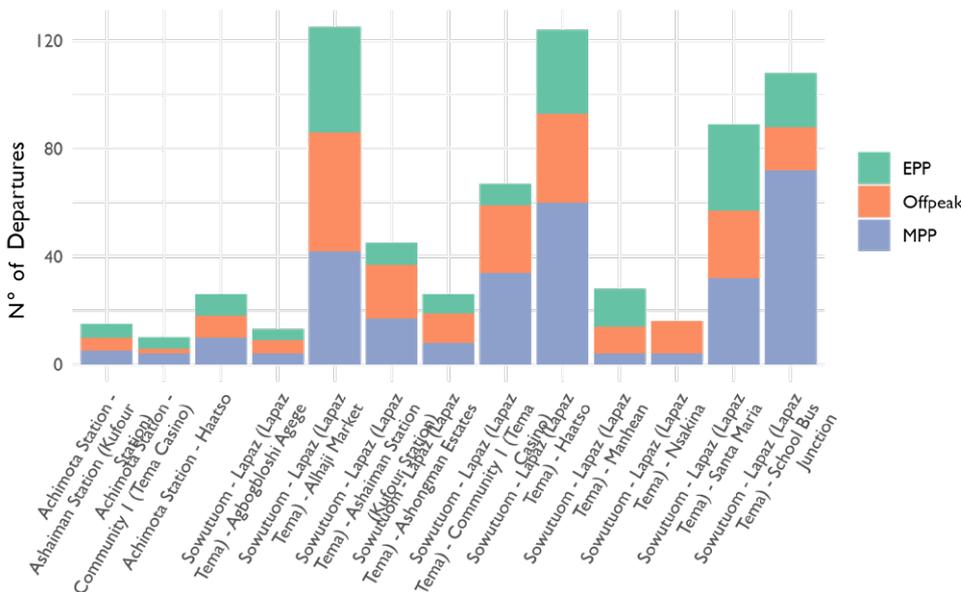


Okaikwei North Municipal Assembly

(1/4)



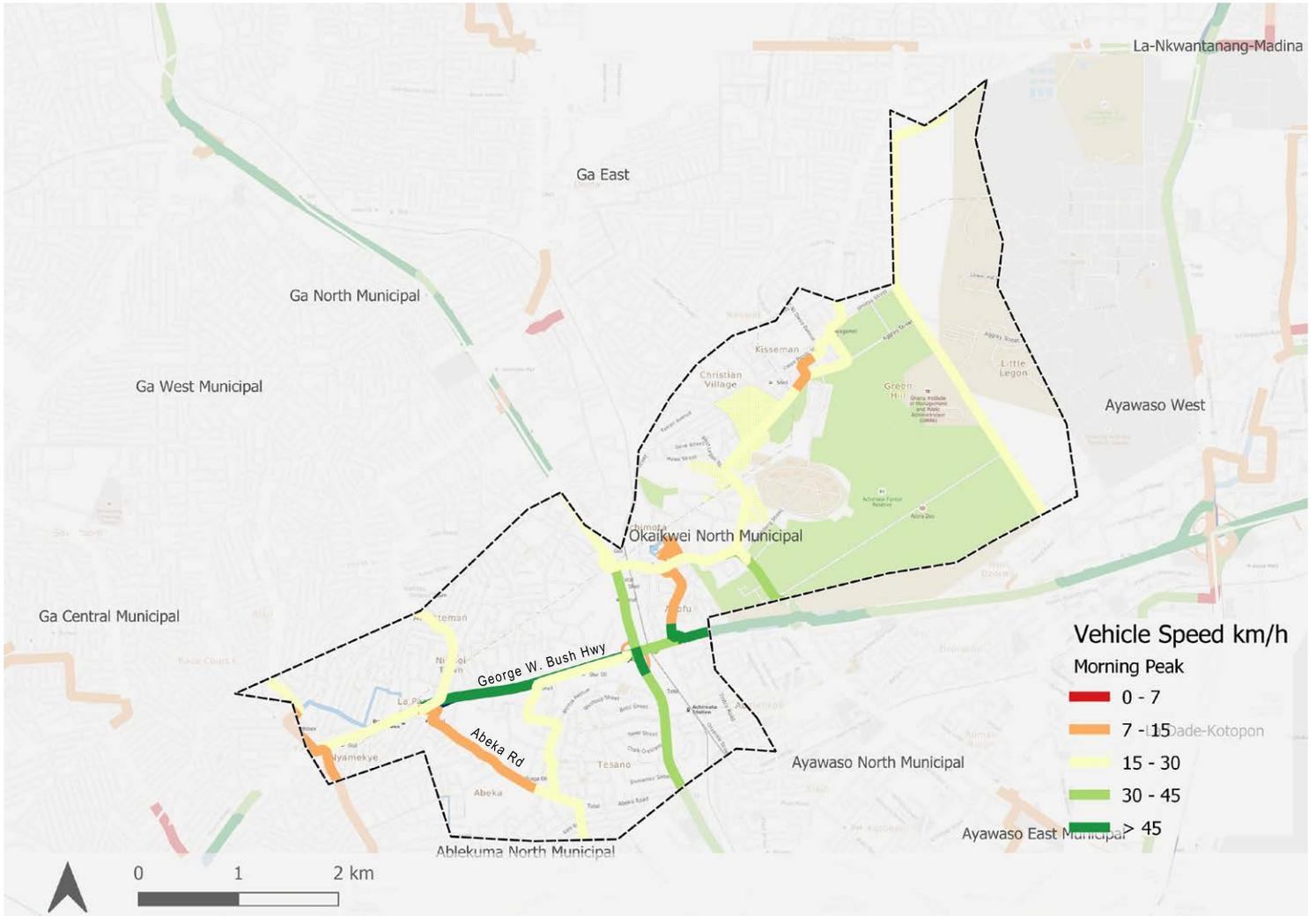
Okaikwei North Municipal



- 13 surveyed routes departing from the Assembly
- 5 surveyed routes with more than 50 daily departures
- One main terminal: Lapaz Market with approx. 3'500 boarding during MPP
- Overall homogenous passenger flows (up to 300 pax/hour during MPP) with a greater concentration along George W. Busch Hwy (up to 1'500 pax/hour during MPP)
- Good distribution of stops along the surveyed routes
- No major congestion issues except along Abeka Rd and next to Accra Zoo

Okaikwei North Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Achimota Station - Ashaiman Station (Kufour Station)	10	25,7	0,2	25,9	12,3	1:30	45	138	8
Achimota Station - Community 1 (Tema Casino)	125	30,5	0,3	21,1	17,2	1:45	60	1628	8
Achimota Station - Haatso	26	6,9	1,0	10,9	8,8	0:45	28	376	3
Sowutuom - Lapaz (Lapaz Tema) - Agbogbloshi Agege	16	10,4	0,8	13,7	12	0:45	60	0	3

Okaikwei North Municipal Assembly

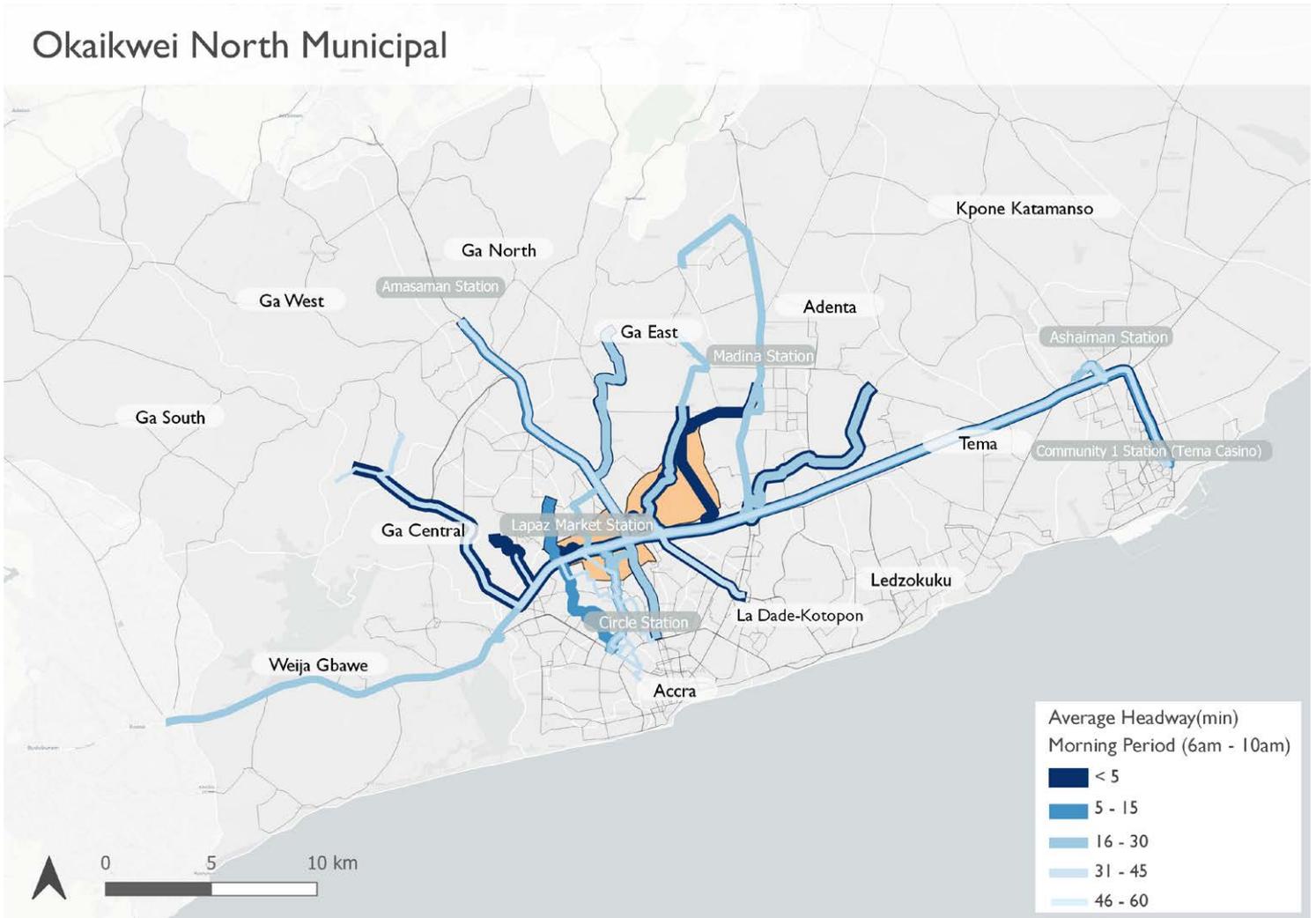
(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Sowutuom - Lapaz (Lapaz Tema) - Alhaji Market	108	3,8	1,8	13,2	12,5	0:20	6	1964	1
Sowutuom - Lapaz (Lapaz Tema) - Ashaiman Station (Kufour Station)	26	27,4	0,2	32,4	29,8	0:55	21	447	8
Sowutuom - Lapaz (Lapaz Tema) - Ashongman Estates	15	15,9	0,8	10,6	15,8	1:15	31	160	4
Sowutuom - Lapaz (Lapaz Tema) - Community 1 (Tema Casino)	13	31,8	0,3	31,4	30,9	1:10	19	215	8
Sowutuom - Lapaz (Lapaz Tema) - Haatso	67	10,7	0,7	19,7	22	0:35	6	1624	3
Sowutuom - Lapaz (Lapaz Tema) - Manhean	28	16,3	0,4	18,8	NA	0:45	39	168	5
Sowutuom - Lapaz (Lapaz Tema) - Nsakina	89	16,5	0,2	17,6	NA	0:55	60	990	7
Sowutuom - Lapaz (Lapaz Tema) - Santa Maria	124	5,8	0,7	31,4	26,4	0:10	8	2226	2
Sowutuom - Lapaz (Lapaz Tema) - School Bus Junction	45	19,1	0,6	20,3	21,9	0:55	8	990	5

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

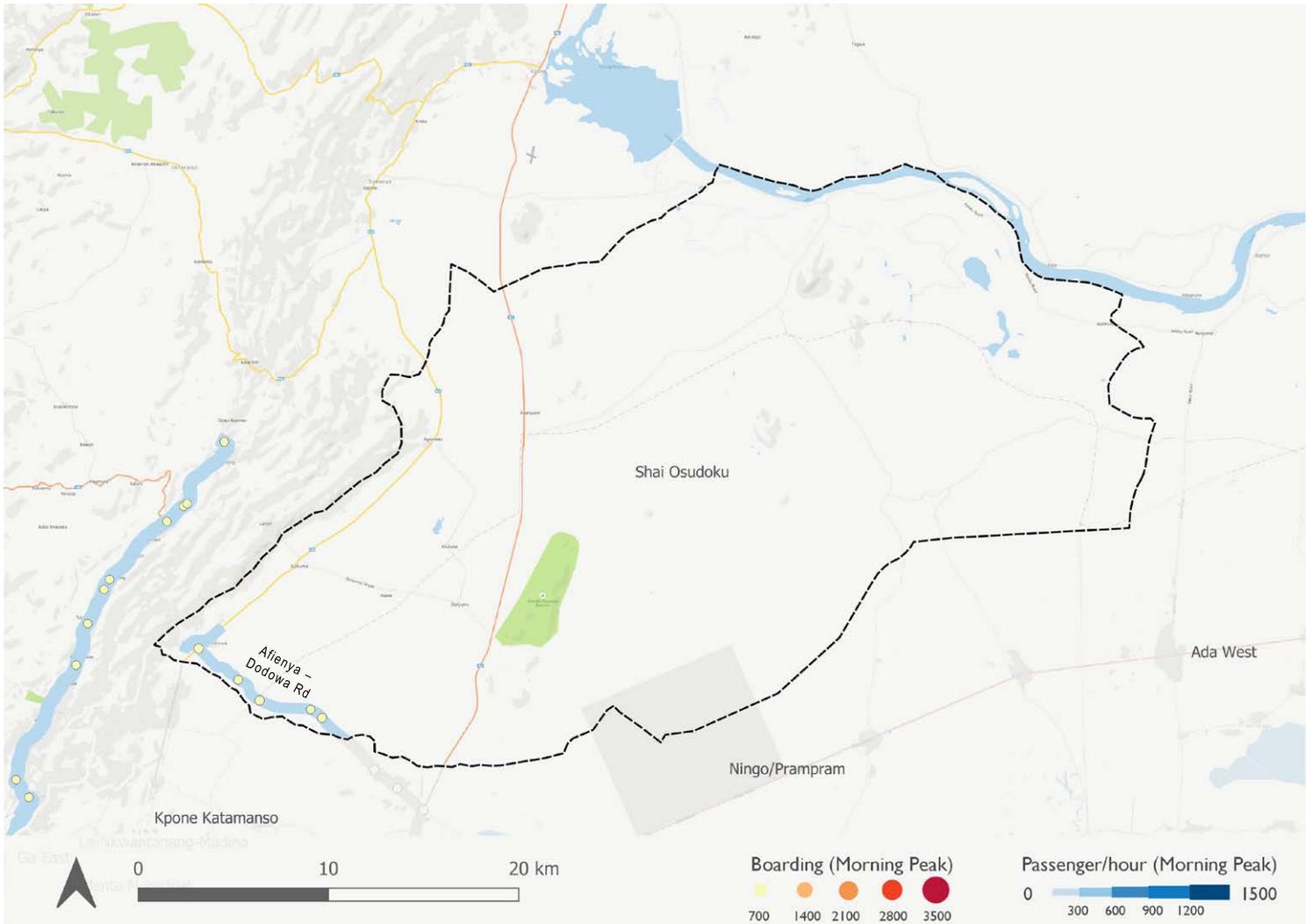
Okaikwei North Municipal Assembly

(4/4)

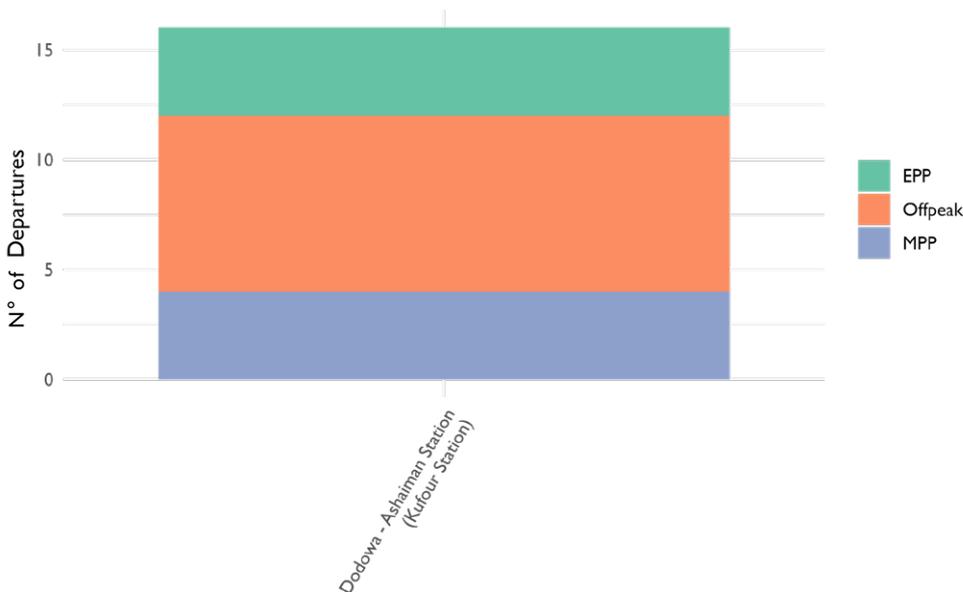


Shai Osudoku District Assembly

(1/3)



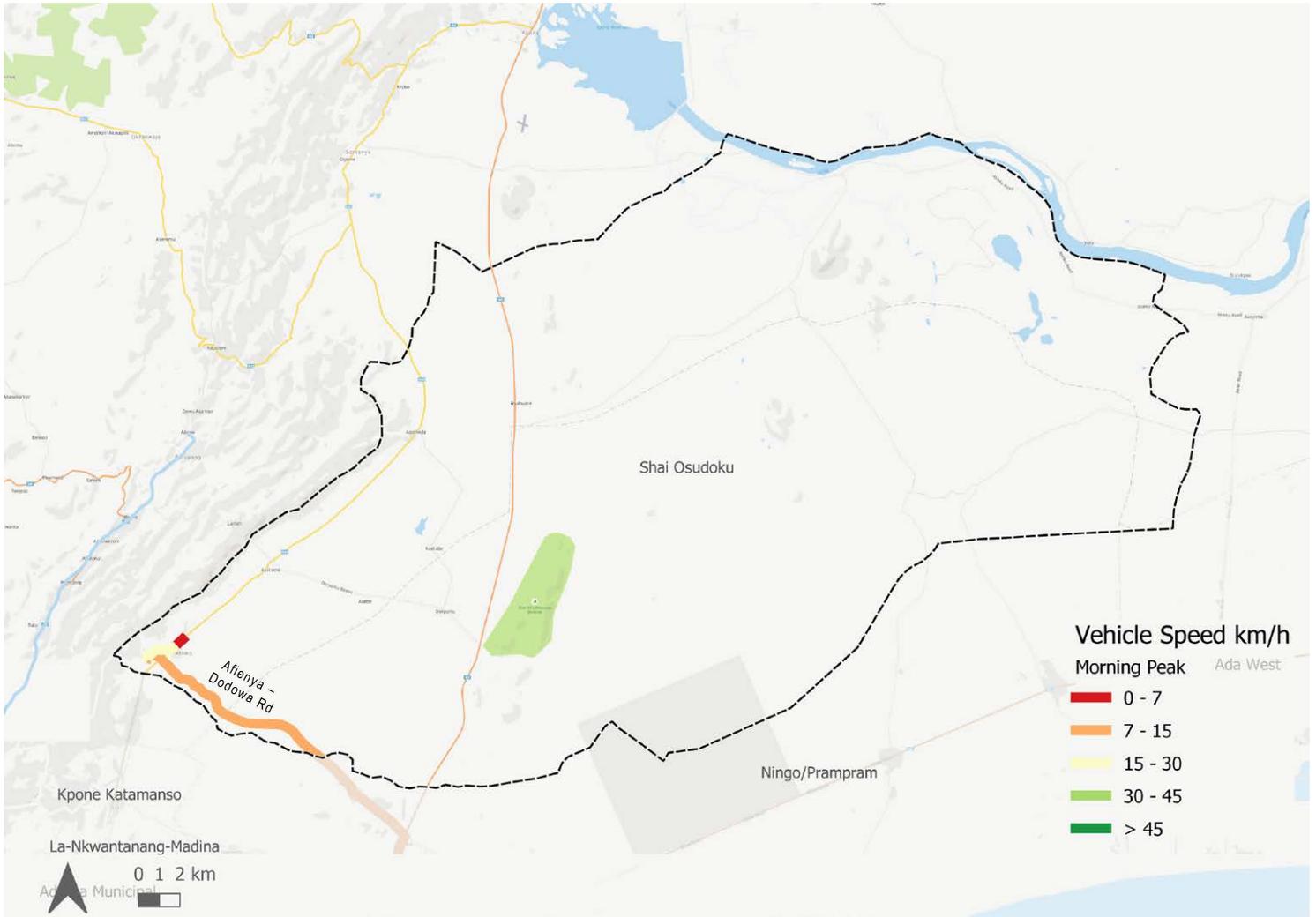
Shai Osudoku



- 1 surveyed route departing from the District with approx. 15 daily departures
- Good distribution of stops along the surveyed routes: 5 stops within the District registering up to 700 boarding during MPP
- Up to 600 pax/hour during MPP
- Congestion issues along Afiyenya – Dodowa Rd with vehicle speed between 7 and 15 km/h during MPP

Shai Osudoku District Assembly

(2/3)

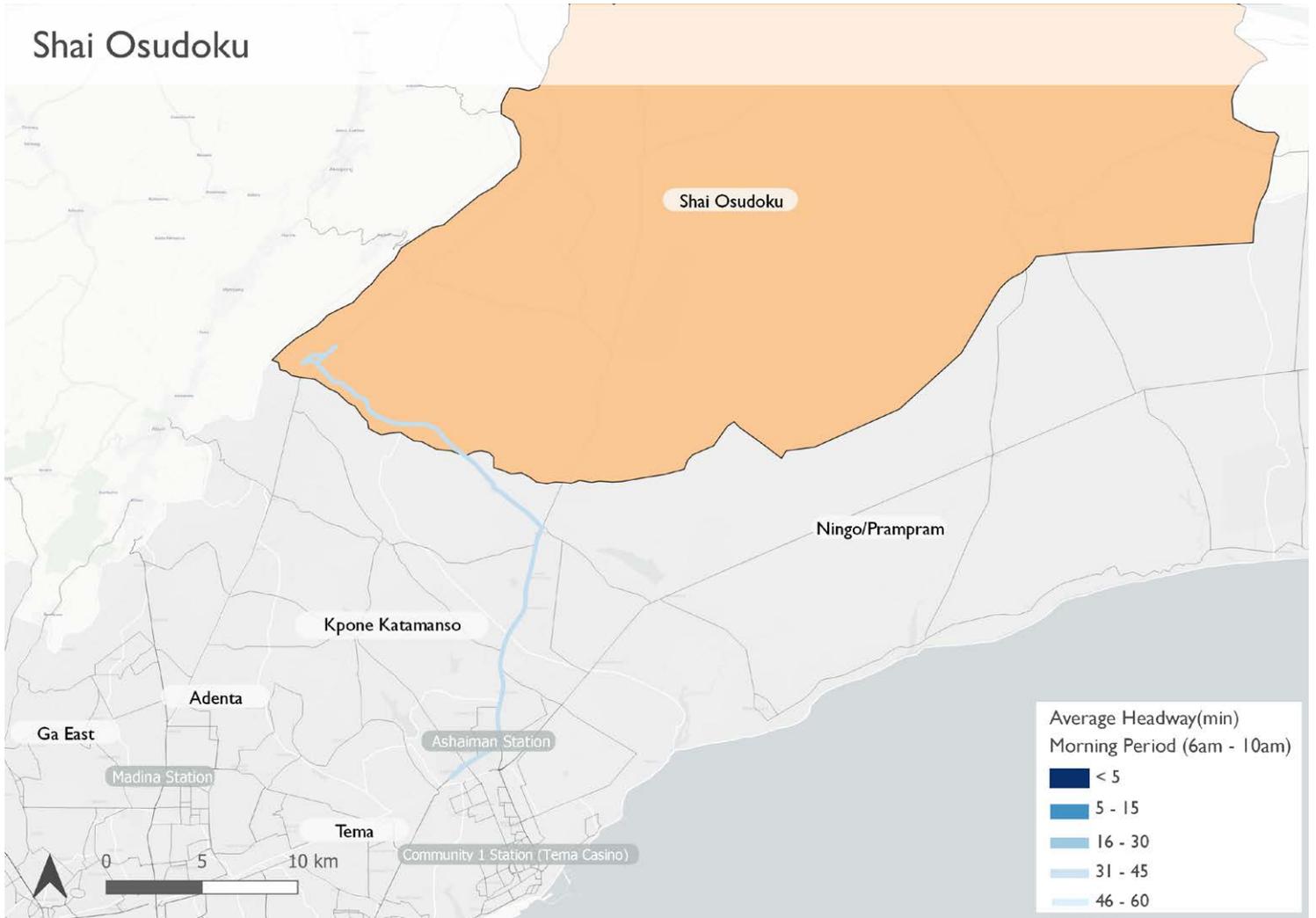


Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
■ Trotro ■ Shared taxi Dodowa - Ashaiman Station (Kufour Station)	16	30,8	0,7	13,5	19,9	01:55	60	332	7

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

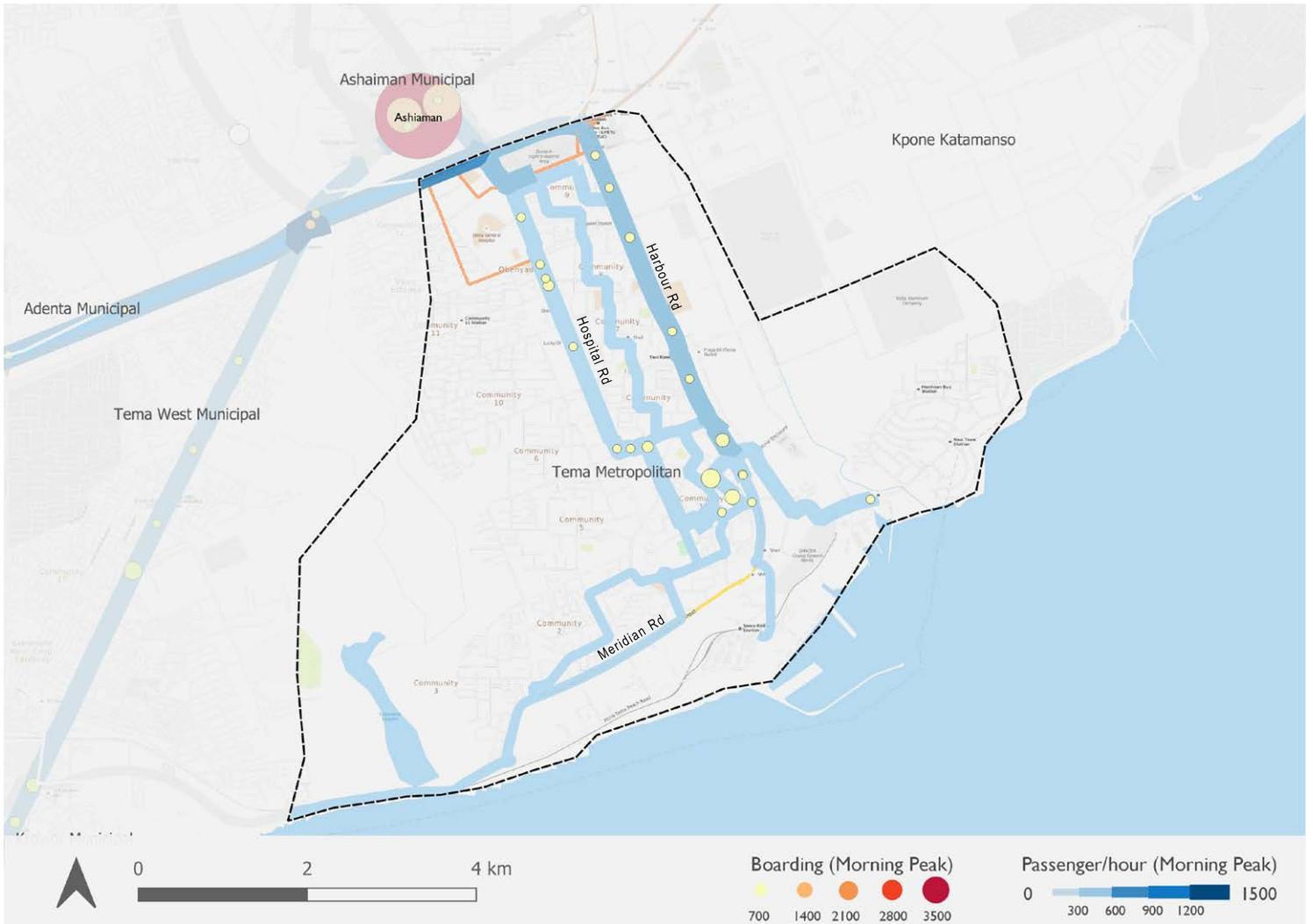
Shai Osudoku District Assembly

(3/3)

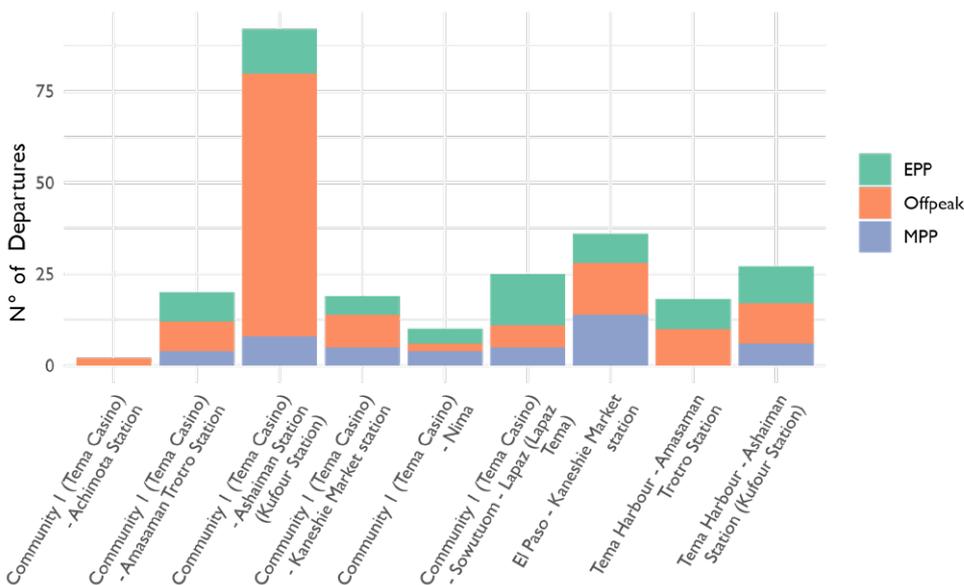


Tema Metropolitan Assembly

(1/4)



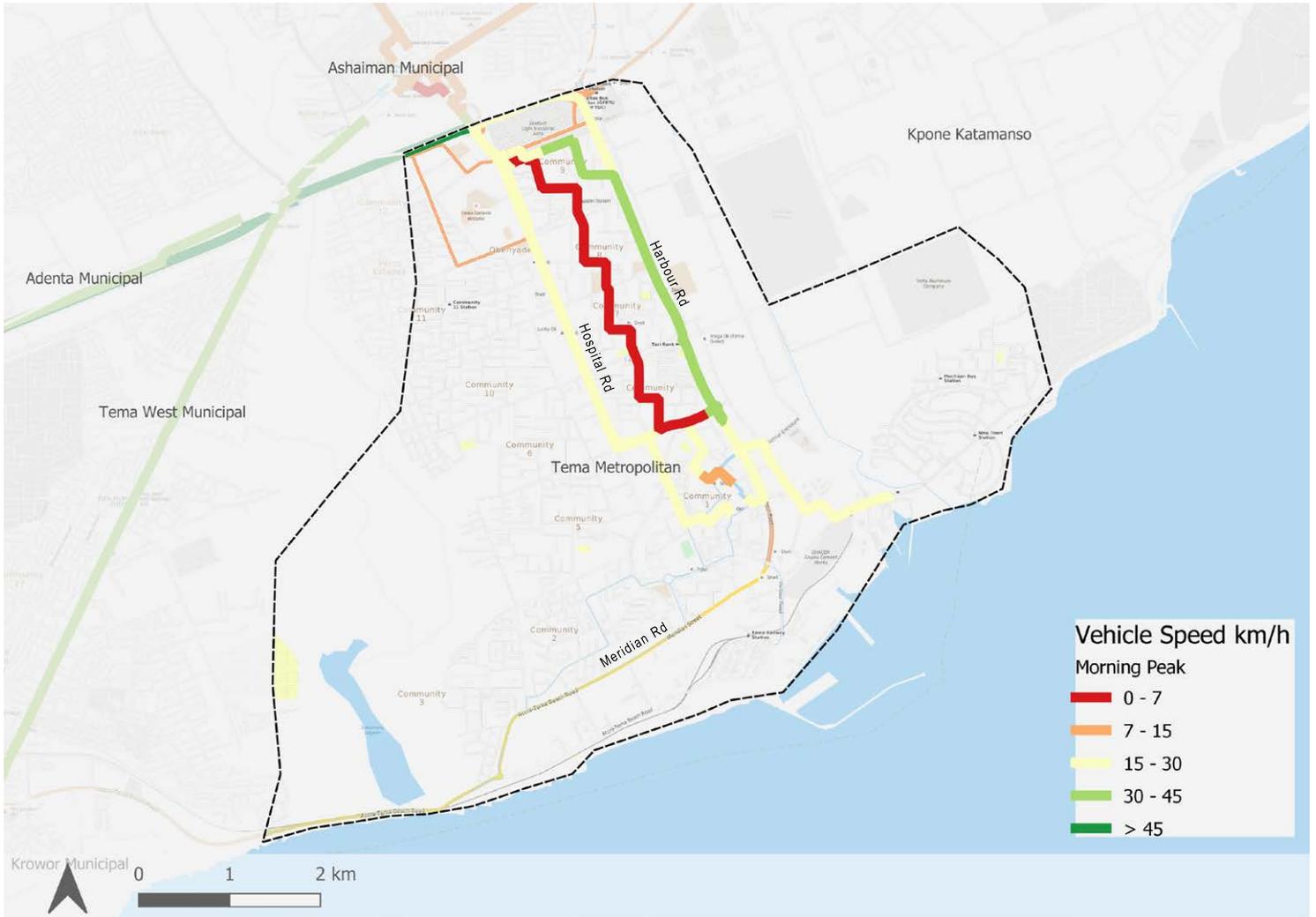
Tema Metropolitan



- 9 surveyed routes departing from the Assembly with approx. 20 to 35 daily departures except for one route with up to 85 daily departures
- Overall homogenous passenger flows along the routes (300 to 600 pax/hour during MPP)
- High density of stops on the borders of the communities with up to 700 boarding during MPP but no stops in the southern part of the Assembly (Meridian Rd, etc.)
- Strong congestion issues within residential sectors (Community 9, 8, 7 and 4) with vehicle speed reaching at most 7 km/h during MPP

Tema Metropolitan Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Community 1 (Tema Casino) - Achimota Station	25	30,8	0,0	31,9	23,8	1:10	NA	537	10
Community 1 (Tema Casino) - Amasaman Trotro Station	18	43,7	0,1	28,0	26,2	1:35	45	200	10
Community 1 (Tema Casino) - Ashaiman Station (Kufour Station)	19	6,7	0,9	11,7	4,7	1:10	25	341	3

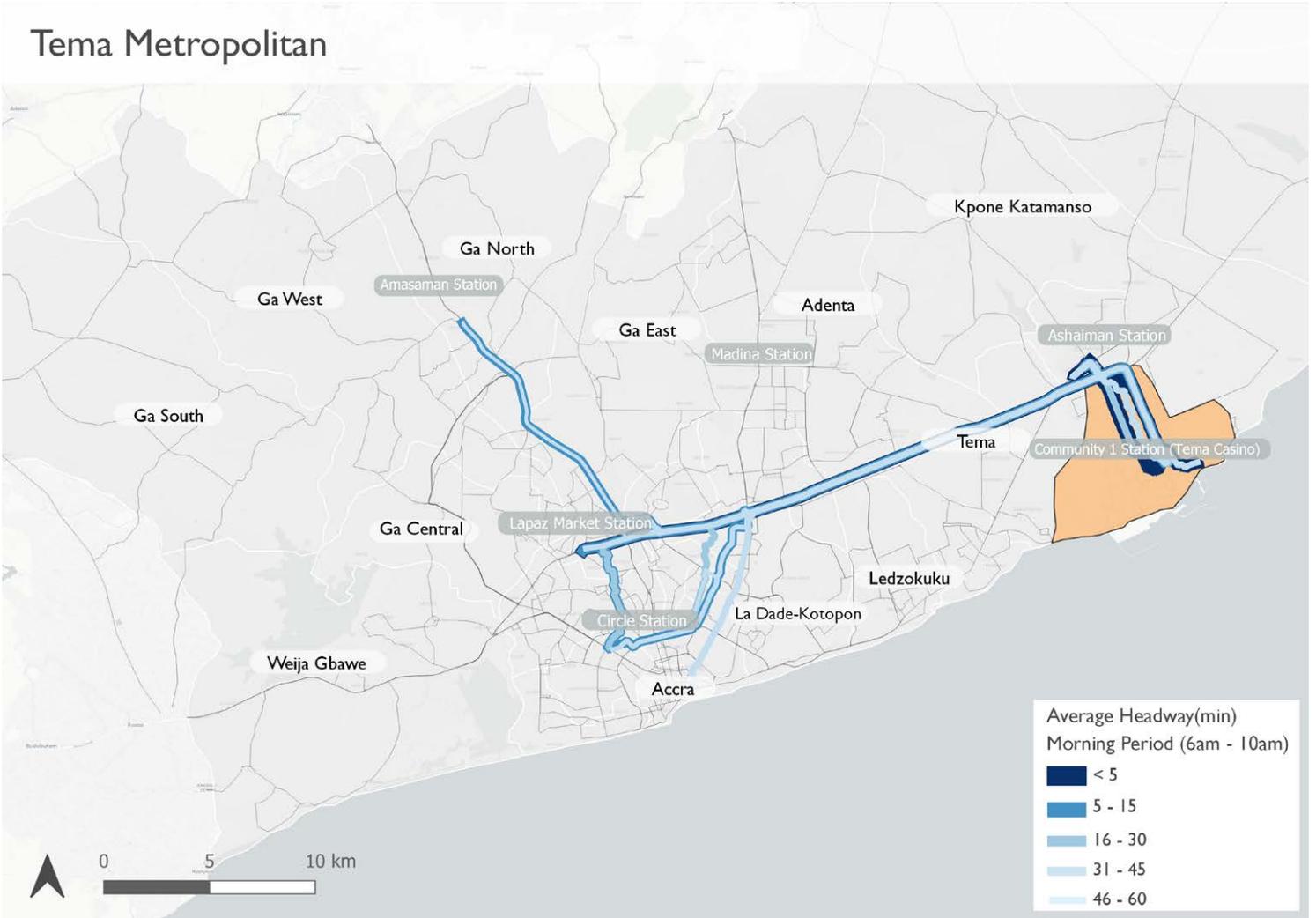
Tema Metropolitan Assembly

(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Community 1 (Tema Casino) - Kaneshie Market station	27	38,1	0,1	14,6	21,7	2:10	48	492	8
Community 1 (Tema Casino) - Nima	2	32	0,1	13,7	NA	2:20	60	40	8
Community 1 (Tema Casino) - Sowutuom - Lapaz (Lapaz Tema)	10	32,3	0,2	31,1	30,6	1:05	31	80	8
El Paso - Kaneshie Market station	20	36,4	0,2	18,9	24,3	1:45	24	400	8
Tema Harbour - Amasaman Trotro Station	92	43,7	0,1	21,5	NA	2:00	30	1316	10
Tema Harbour - Ashaiman Station (Kufour Station)	36	9,8	0,4	12,1	14,2	0:55	33	756	4

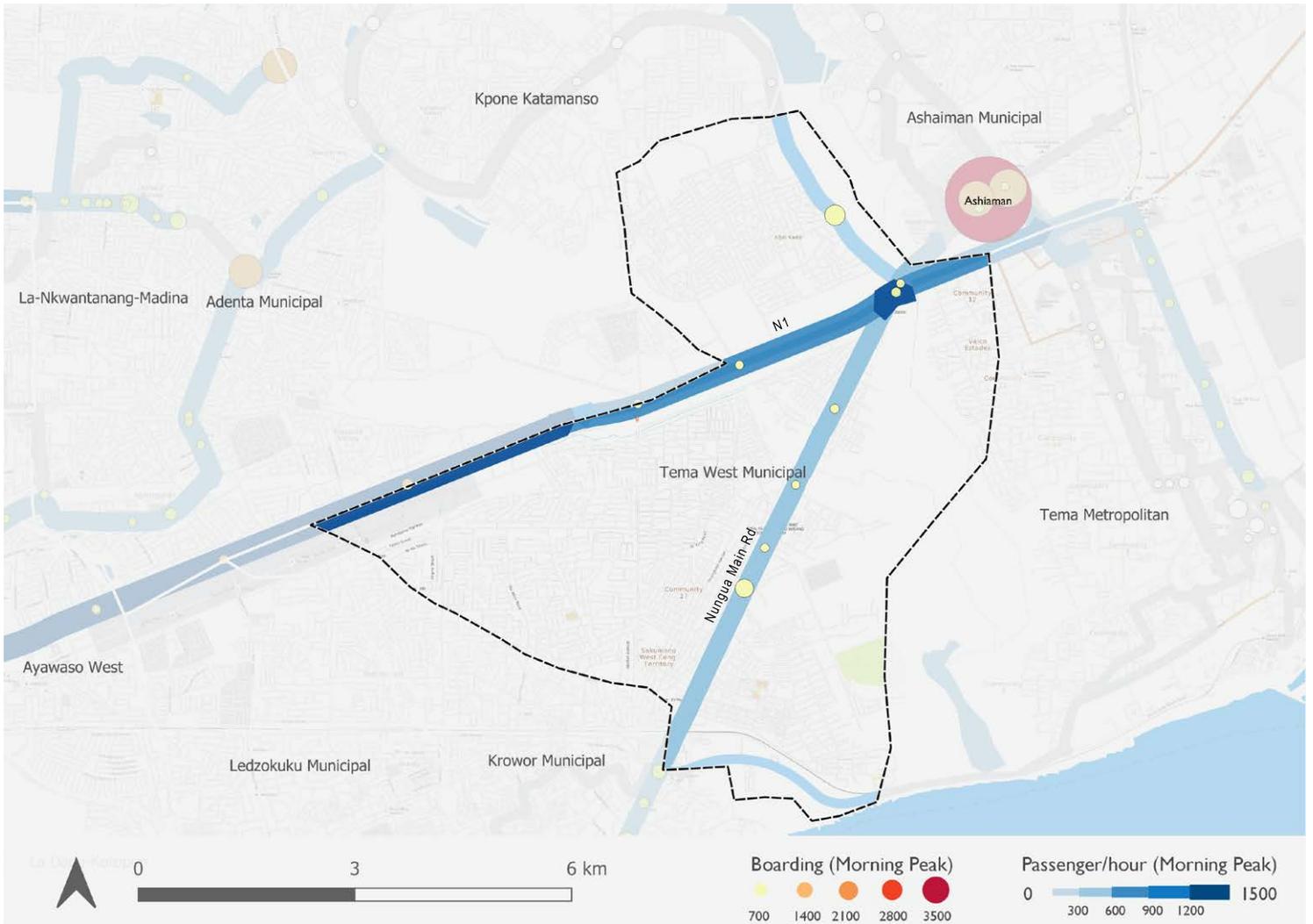
Indicators based on a limited number of observations – average speed may not be representative of typical conditions

Tema Metropolitan Assembly



Tema West Municipal Assembly

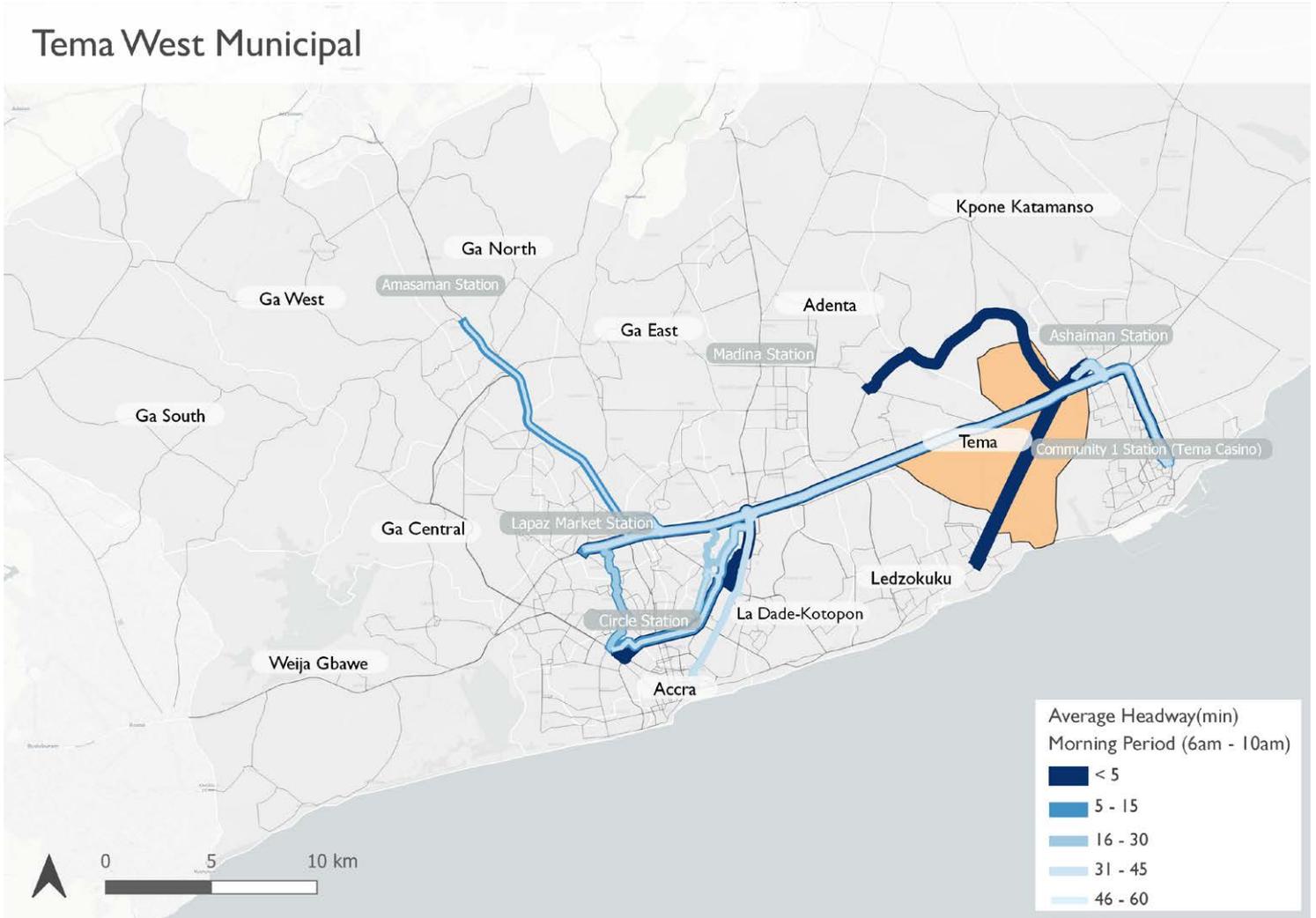
(1/2)



- No terminals in the Assembly for the surveyed routes: routes transiting the Assembly
- Good distribution of stops along the surveyed routes: 10 stops within the area with up to 700 boarding during MPP
- Overall homogeneous passenger flows along the routes with up to 1'200 pax/hour during MPP along N1 Highway
- No congestion issues with vehicle speed greater than 30 km/h during MPP along N1 Highway and Nungua Main Rd

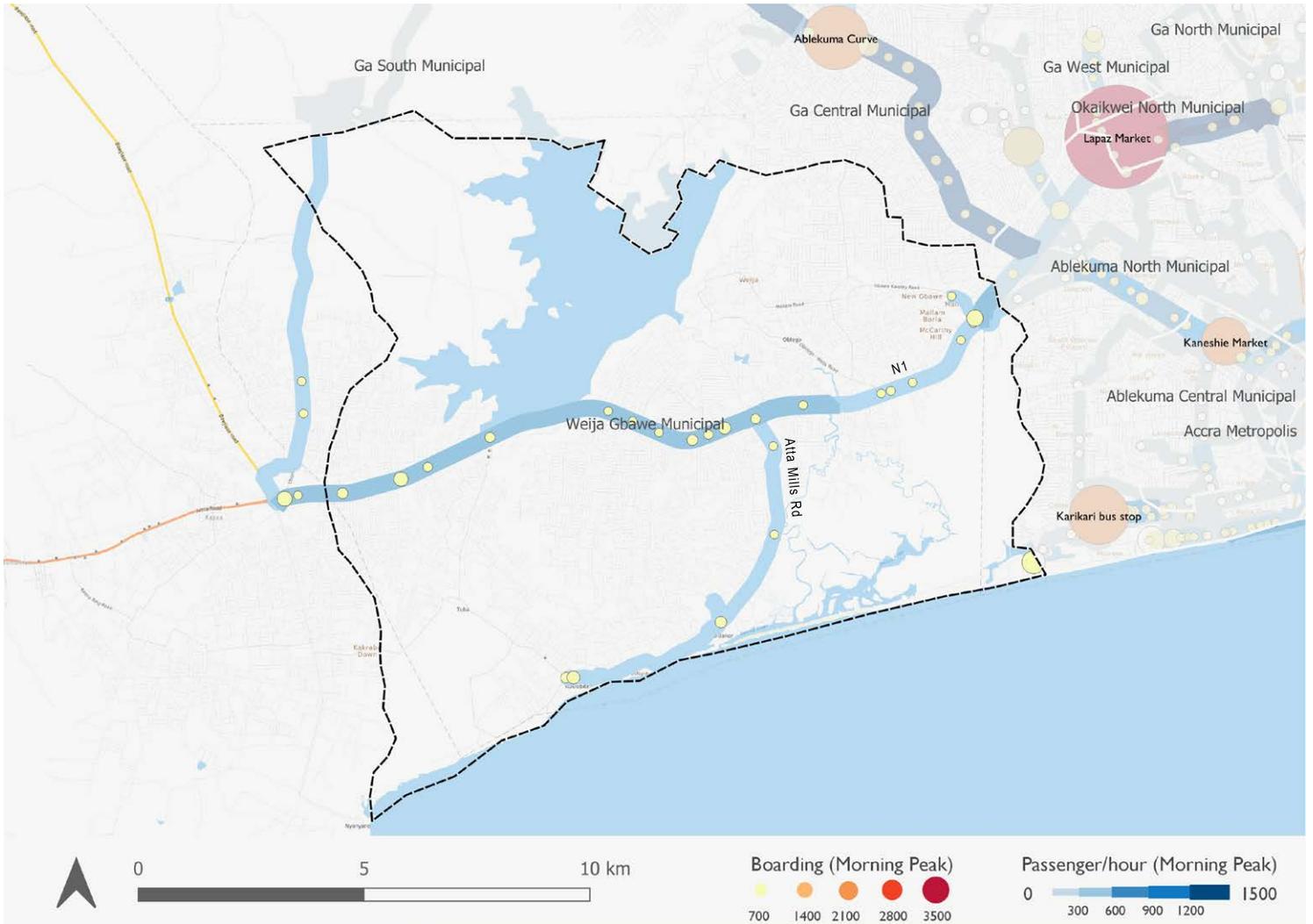
Tema West Municipal Assembly

(2/2)

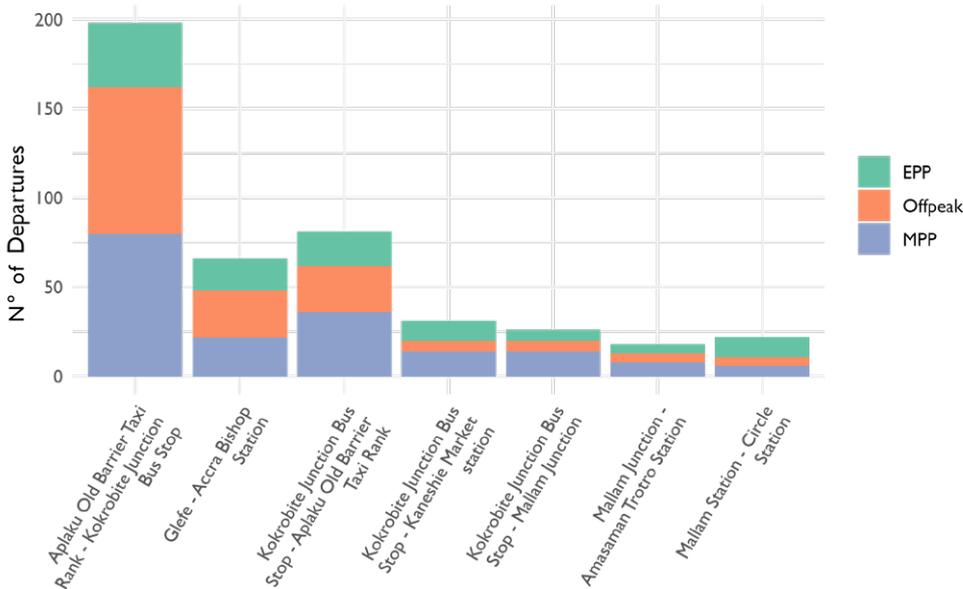


Weija Gbawe Municipal Assembly

(1/4)



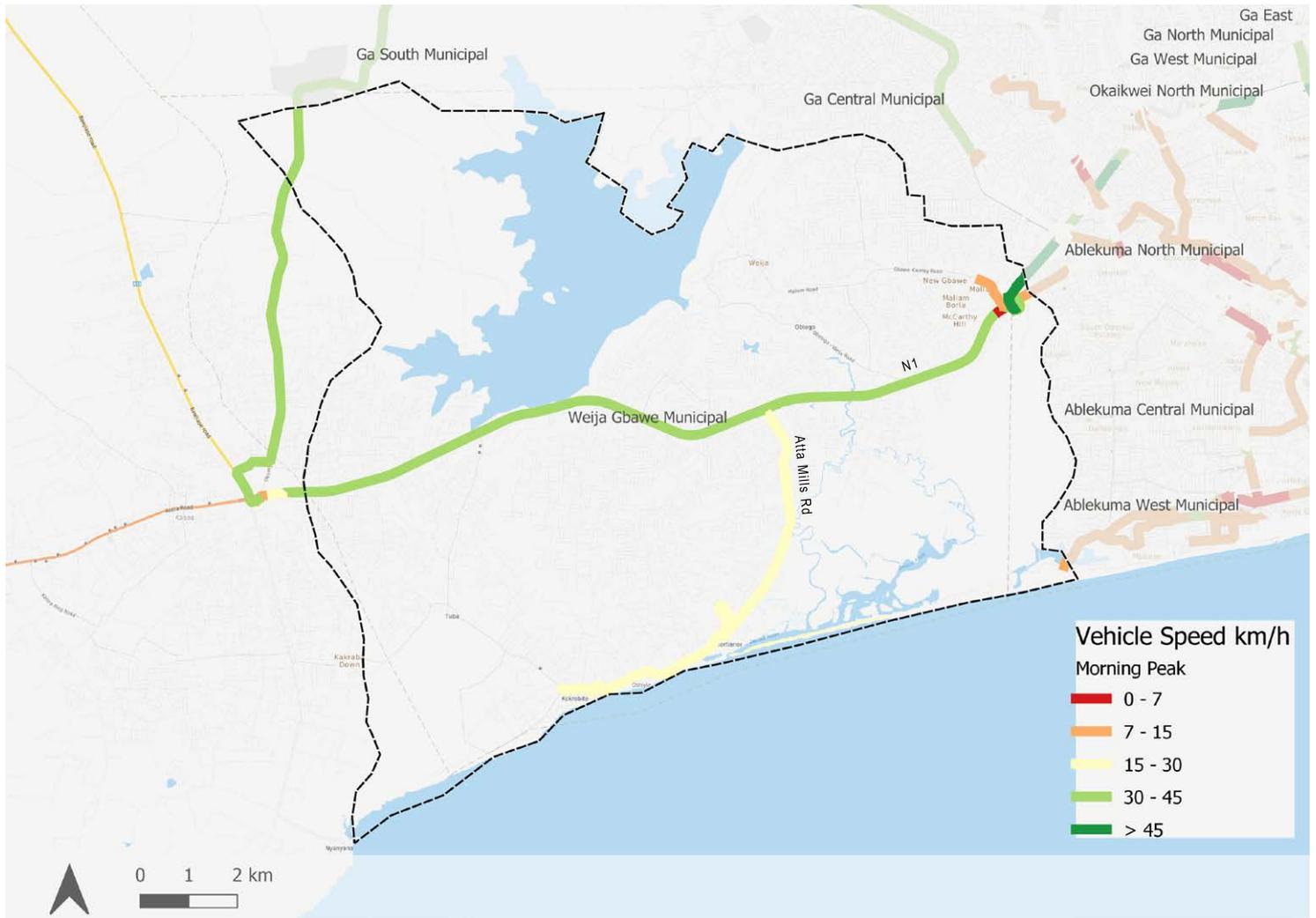
Weija Gbawe Municipal



- 7 surveyed routes departing from the Assembly with one route registering up to 200 daily departures
- Overall homogeneous passenger flows during MPP (300 to 600 pax/hour)
- Good distribution of stops along the routes especially along the N1 Highway
- Up to 700 boarding per stop during MPP
- No major congestion issues except at the eastern boundary with Ablekuma North Municipal Assembly

Weija Gbawe Municipal Assembly

(2/4)



Name	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Aplaku Old Barrier Taxi Rank - Kokrobite Junction Bus Stop	18	9,7	0,2	27,8	34,4	0:20	5	327	4
Glefe - Accra Bishop Station	22	10	0,7	15,0	17,7	0:40	12	212	3
Kokrobite Junction Bus Stop - Aplaku Old Barrier Taxi Rank	31	9,3	0,2	27,9	NA	0:20	10	480	4
Kokrobite Junction Bus Stop - Kaneshie Market station	81	21,3	0,5	NA	13,8	1:35	20	175	4

Weija Gbawe Municipal Assembly

(3/4)

Name <small>■ Trotro ■ Shared taxi</small>	Departures per day	Length [km]	Average stops per km	Average speed PP [km/h]	Average speed Offpeak [km/h]	Average travel time PP [hh:mm]	Headway PP [min]	Daily pax served	Fare [¢]
Kokrobite Junction Bus Stop - Mallam Junction	66	14,9	0,1	18,6	19,5	0:45	28	1400	4
Mallam Junction - Amasaman Trotro Station	26	19,9	0,5	14,4	12,1	1:30	38	234	8
Mallam Station - Circle Station	198	9,6	0,8	8,7	16,5	0:35	31	872	3

Indicators based on a limited number of observations – average speed may not be representative of typical conditions

Weija Gbawe Municipal Assembly

(4/4)

