AIR QUALITY SYSTEMS EAST AFRICA

AQS/PG/25/3

Establishing the Nairobi City County Air Quality Monitoring Program

Network Deployment Plan

February 2025

Air Quality Systems East Africa

REPARED FOR THE CLEAN AIR FUND AND NAIROBI CITY COUNTY GOVERNMENT UNDER PROJECT NO. 001609

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Contents

Executive summary

This low-cost sensor (LCSs) deployment plan is developed as a guide for installation of monitors under the Procurement and deployment of a comprehensive city-owned low-cost sensor AQ monitoring network project. This plan provides guidance and information on the rationale for site selection and optimal deployment of a robust and hyperlocal network of LCSs under the private-public umbrella led by the Nairobi City County Government (NCCG). The guidance focuses on LCSs for ambient particulate matter measurement.

In this plan, we summarized the types of sites and major steps taken to design a monitoring network for Nairobi City County (NCC). For this hybrid network with pre-deployed reference grade monitors (RGM), measurement accuracy of the LCS was considered and provision for assessment at RGM stations provided in the plan. This approach will support the NCCG team in development of citywide calibration models for LCSs.

This plan also provides other considerations for siting with provision for temporal and spatial coverage of the network. Finally, the plan summarizes the design of the monitoring network, site verification process and quality control through provision of maps. The comprehensive mapping exercise provides the spatiotemporal distribution of active stations and gaps to be filled by the LCSs to be deployed as part of this project main outcome.

1. Introduction

This deployment plan aims to provide information on deploying low-cost sensors (LCSs) in collaboration with Nairobi City County Government (NCCG) authorities with the objective of providing real time air quality data to be utilized by general public, policy makers, non-governmental organizations, communities, etc. This plan does not include description and considerations for LCS calibration. We divided the plan into the following core sections:

- Selection of LCSs deployment sites
- Design of LCS network including collocation sites for the verification and drift check of LCSs data.
- Deployment map for hyperlocal network.

The plan focuses on LCSs of particulate matter (PM, including PM_{10}, $PM_{2.5}$ and PM) and is written out of collective experience gained by individuals developing and managing integrated smart air quality sensors and digital systems. For site selection criteria, LCSs systems components such as solar powered/batteries, signal processing, data storage and transmission, protective casing and mounting accessories are considered as deployable units.

We also considered deployment options for core sites containing reference grade monitors (RGM). In this case, the RGM stations will serve as collocation facilities for LCS validation and calibration. Even though we do not describe the calibration process in this deployment plan, we expect data from the core reference sites to inform development of localised calibration models to be adopted for LCS.

2. Participatory design of hyperlocal sensor networks

Networks of air quality sensors are made up of pre-calibrated and verified reference stations that are followed by LCSs deployment where sites are selected in accordance with pre-determined monitoring objectives and data usage[1]. For instance, collocation studies conducted by the Global Environmental and Occupational Health (GEOHealth) Hub for Eastern Africa from University of Nairobi provides a basis for LCS data standardisation and development of calibration models and protocols for sensor performance evaluation. In this project with the focus on general population exposure to air pollution in

Nairobi, the network combines both collocation and deployment of LCS at locations with different population characteristics, e.g., transport sector emissions from busy streets, urban and background sites etc.

Designing these networks is a consultative process that includes multiple stakeholders, e.g., national/county air quality monitoring units/agencies, research institutions, LCSs hosts, private sector and the public. This consultative process yields suggestions for the location of LCS. In this project, deployment of LCS will ideally include two steps: field collocation for calibration and deployment. The calibration process and analysis are out of the scope of this plan, but procedures followed by the selected LCS manufacturer[2] and AfriSET sensor evaluation center[3] are available for reference.

2.1 Status of monitoring in Nairobi City County

We employ multiple methods to identify the existing monitoring infrastructure, network gaps, optimize placement and classify the monitoring sites according to EPA guidelines.

[1] Yatkin, Sinan, Michel Gerboles, Annette Borowiak, and Msrco Signorini. "Guidance on low-cost air quality sensor deployment for non-experts based on the AirSensEUR experience." *Joint Research Centre (JRC), the European Commission's science and knowledge service* (2022).
[2] Adong, Priscilla, Engineer Bainomugisha, Deo Okure, and Richard Sserunjogi. "Applying machine learning for large-scale field calibration of low-cost PM2. 5 and PM10 air pollution sensors." *Applied AI Letters* 3, no. 3 (2022): e76.
[3] https://afriset-files.s3.eu-west-2.amazonaws.com/Field+evaluation+for+AirQo_2.5.pdf

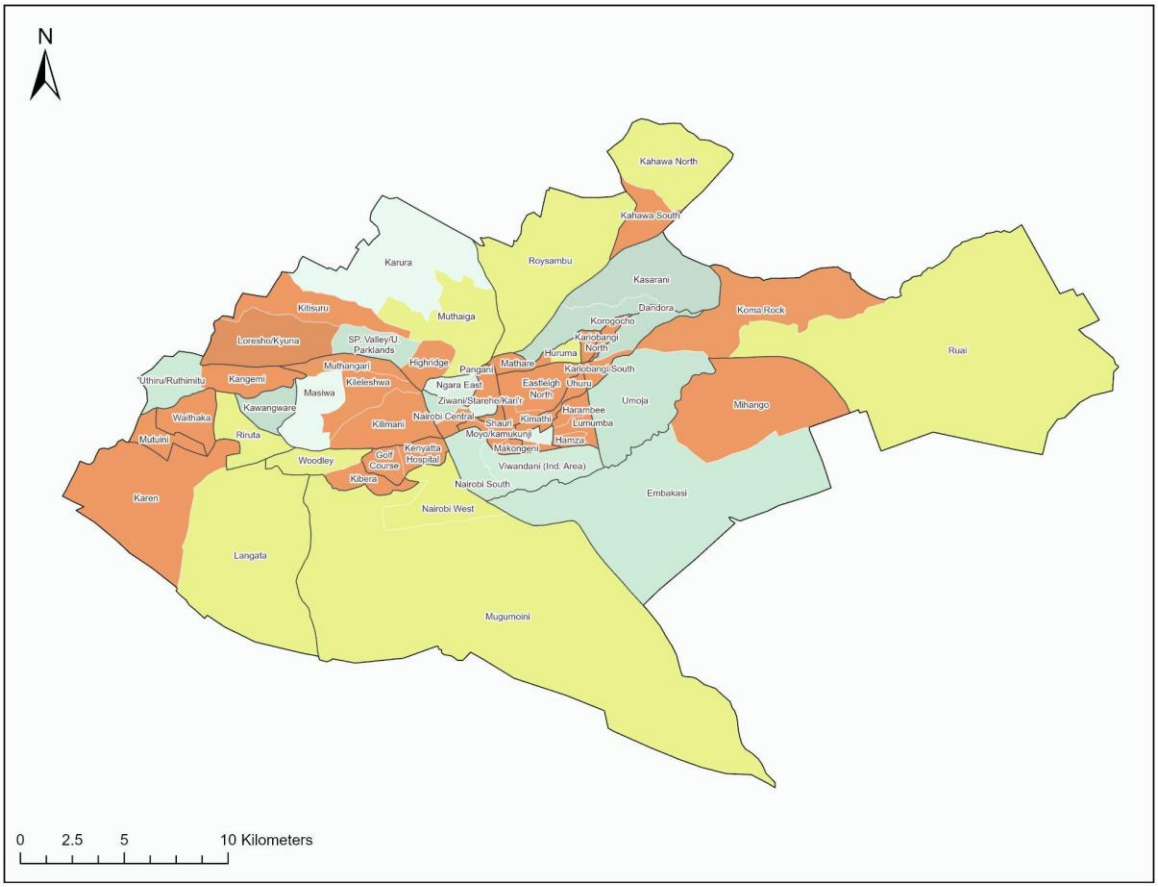

Figure 1. Status of air quality monitoring in Nairobi

The provided map of Nairobi visually represents the current state of air quality monitoring coverage across the county's various wards. The color-coding scheme provides a clear indication of the distribution and density of air quality monitoring stations:

- **Green:** Wards marked in green indicate the presence of at least one operational air quality monitoring station. These stations have been deployed by various stakeholders invested in Nairobi's environmental well-being.
- **Lime Green/Yellow:** Wards depicted in lime green or yellow signify areas with limited air quality monitoring stations. While some monitoring might be in place, it is insufficient to meet the needs of the ward and efficiently represent the state of pollution. These areas require the deployment of additional monitoring stations to ensure comprehensive and effective air quality data collection.
- **Orange:** Wards highlighted in orange represent areas with a complete absence of air quality monitoring stations. These wards are a priority for the current and future Nairobi City County's monitoring efforts, and suitable sites within these wards to

be identified and prioritized for the installation of monitoring stations.

This map serves as a valuable tool for visualizing the existing gaps in Nairobi's air quality monitoring network.

2.2 Site classification

The hierarchical classification system used in this project for site classification is based on the work of researchers at the University of British Columbia[4].

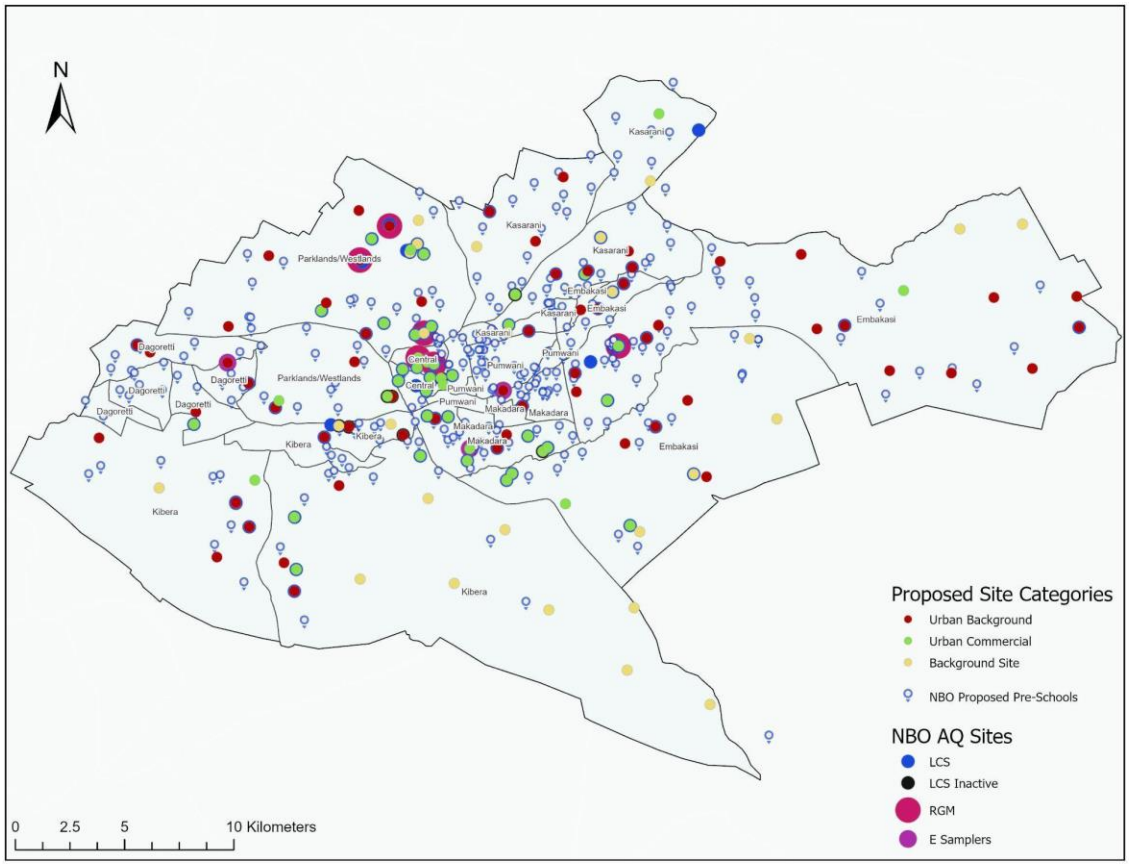

Figure 2. Map of monitoring sites in Nairobi with additional site suggestions

2.2.1 Site types

Class 4 characterizes sites in terms of source influences. These include general population exposure, regional background and local source–influenced (transportation and point source).

General population exposure

These sites measure urban background conditions where concentration gradients are

[4] Brauer, Michael. "BC Clean Air Research Fund." *Organization* 13, no. 2013/14 (2012).

typically small. This means that the measurements taken at these sites are generally representative of larger areas and can be used to assess community-wide or neighborhood-wide population exposure to air pollutants. These sites are crucial for understanding the overall air quality in urban areas and its potential health impacts on the general population.

Regional background

Regional background sites are situated outside of urban areas. Their purpose is to measure air pollutants entering and exiting urban areas, including those from distant or transboundary sources. Additionally, they measure background concentrations of air pollutants. These sites are essential for determining the contribution of local sources versus distant sources to air pollutant concentrations. They can also be utilized to broaden the spatial coverage of monitoring for air quality forecasting, mapping, modeling, and remote sensing applications.

Local source-influenced

Local source-influenced sites, including transportation and point source-influenced sites, are located near pollution sources like major roads and factories. These sites monitor air quality to assess the impact of local sources on nearby populations, aiming to develop strategies to reduce emissions and improve air quality.

Transportation-influenced

In 2010, the Health Effects Institute conducted a review on traffic-related air pollution (TRAP) gradients and health effects. Based on this review, sites within 100 m of a major roadway, in large or medium urban areas, are classified as transportation influenced. Major roadways are classified as having volumes greater than 15,000 annual average daily traffic (AADT) counts. These sites are located in areas significantly impacted by transportation emissions.

Point source-influenced

Point source-influenced sites are located in populated areas close to major stationary sources of emissions, such as volatile organic compounds (VOCs) or sulfur dioxide (SO2). These sites are important for monitoring and assessing the impact of industrial emissions on air quality and public health in surrounding areas. The figure below shows the distribution of SO2 and Formaldehyde from 2022-2024 as seen by the TROPOMI instrument onboard the Sentinel 5p Satellite mission. The analysis of these sites has confirmed significantly higher levels of SO2 or VOCs compared to transportation and general population exposure sites, validating their classification.

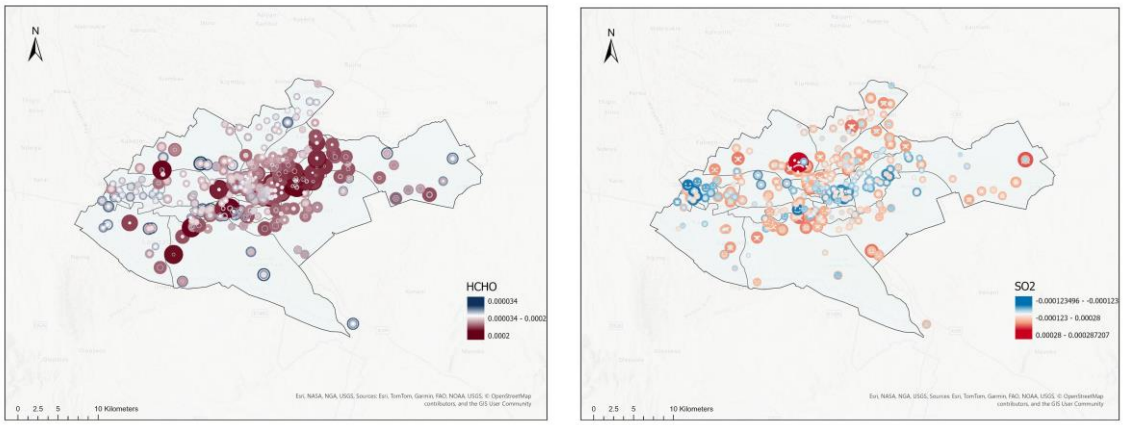

Figure 3. Point-source influenced regions of Nairobi City County

2.3 Network design

Nairobi City County Government alongside key stakeholders of the Nairobi Air Quality Working Group (NAir) already established a subset of “core” monitoring sites that are meant to measure a comprehensive set of air pollutant parameters. Two of these core sites have established reference stations that satisfy many monitoring objectives and provide the basis for multi-pollutant characterizations across a range of site types. The core sites are designed to operate in addition to the other NCCG sites, which are designed specifically to meet various program and pollutant-specific requirements.

2.3.1 Core sites

Core sites include a comprehensive set of measurements at a select number of representative locations across Nairobi that addresses multiple monitoring objectives. The integrated NCCG PM2.5 reference method sampling sites form the basis of the core sites. In addition, continuous PM2.5, O3 and NO2 parameters should be included, as a minimum. Additional parameters (e.g., CO, PM10, SO2, VOC) are measured at a subset of core sites.

Some of the factors considered for locating core sites include population, geographical and spatial representativeness, areas with known or suspected high pollutant concentrations, areas influenced by local emission sources.

Table 1. Core sites in Nairobi

Parameter	**Site 1 (MLKH)**	**Site 2 (FS)**
PM2.5 (RGM)	☑	☑

PM2.5 (LCS)	☑	☑
CO		
O3		
NO2		
SO2		
VOC		
Black carbon	☑	☑
Meteorological (Humidity, temperature, wind)	☑	☑

The core air quality monitoring stations will be useful for developing a quantitative objective for the accuracy of LCSs data. We aim to use the two core sites co-owned by NCCG as the primary collocation stations whose data will be used for developing calibration models or correction of LCS bias. For selection of the method, permanent collocation of at most 6 LCS will be used as opposed to routine collocation that is labour and cost intensive[5].

2.3.2 Pollutant-specific sites

Additional sites that target specific secondary monitoring objectives are also being considered. These sites expand the spatial coverage of monitoring for use in air quality forecasting, mapping, modelling and remote sensing applications across the city. Sites for monitoring particulate matter precursor pollutants such as VOCs, regional background sites located outside of urban areas (pollutants flowing into and out of urban areas from distant sources, including transboundary sources and background concentrations) and near-road sites for TRAP form the basis for pollutant-specific sites.

2.3.3 Considerations for siting

The Air Quality Regulations of 2014, established as objectives under the Environmental Management and Co-ordination Act (EMCA) 1999, aim to manage and mitigate air pollution in Kenya. These regulations specifically address known pollutants such as Particulate Matter 2.5 (PM2.5), Ozone (O3), Nitrogen Dioxide (NO2), and Sulfur Dioxide

[5] Yatkin, Sinan, Michel Gerboles, Annette Borowiak, and Msrco Signorini. "Guidance on low-cost air quality sensor deployment for non-experts based on the AirSensEUR experience." *Joint Research Centre (JRC), the European Commission's science and knowledge service* (2022).

(SO2), which have been identified as having significant impacts on human health and the environment.

General considerations

To effectively monitor and manage air quality, the following recommendations are made for the strategic distribution of air quality monitoring sites:

- **Population density:** Communities with populations exceeding 100,000 people should have at least one site installed for continuous measurement of PM2.5 and other criteria pollutants. This is due to the increased likelihood of higher pollution levels in densely populated areas, which can result from various sources such as vehicle emissions, industrial activities, and domestic biomass burning.
- **Local land use:** General population exposure sites are in residential, commercial, or industrial areas. Regional background sites are in less populated areas like agricultural or forested land. Park category sites can be urban or non-urban. Additional factors include proximity to roads, elevation, wind direction, and accessibility.
- **Proximity to point sources:** Communities located near major point sources of pollution, such as industrial facilities, power plants, and major roadways, should prioritize the measurement of SO2 and Volatile Organic Compounds (VOCs).
- **TRAP:** locating the stations within 30 m of the outside edge of the nearest traffic lane to measure black carbon, CO, NO2, O3, PM2.5, SO2, ultra-fine particles and in specific cases, traffic counting.
- **Additional considerations:** In addition to population distribution and proximity to point sources, other factors should be considered when identifying air quality monitoring sites. These factors include regional population density, local air quality data and trends, and public concern or complaints regarding air pollution.
- **Baseline monitoring:** Ward representative background sites, which are intended to provide baseline air quality data, should measure at least PM2.5. This will allow for the assessment of long-term trends in air quality and the identification of potential sources of pollution.

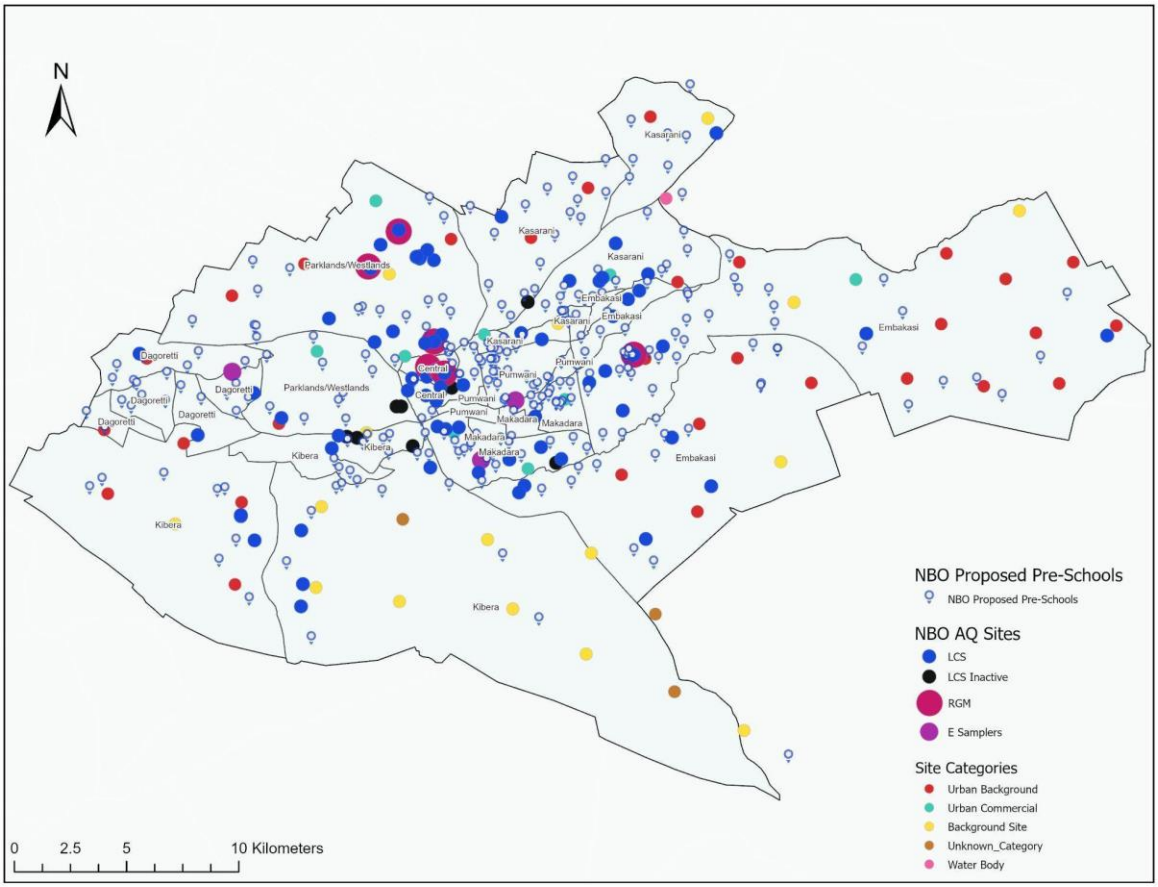

Figure 4. Additional sites recommended for monitoring considerations including NCCG facilities

Practical considerations

A number of practical considerations should be accounted for prior to final site selection:

- stakeholders and collaboration partners
- station design within existing structures (e.g. access to roof)
- site suitability in terms of terrain (e.g. terrain to allow free circulation of air)
- security against unauthorized access and vandalism
- site safety
- direct sunlight exposure
- availability of communication systems (e.g., cellular reception)
- location accessibility
- long-term viability of the site
- availability of poles for installation

Note: Ideal siting may not be possible for practical, logistical or other reasons and exceptions should be made for some locations that do not meet all recommended criteria.

2.4 Candidate sites

NCCG proposed deployment of LCS across county owned infrastructure such as offices, health facilities and schools with preference given to primary schools with pre-schools facilities. A total of 226 schools within the county were provided by NCCG for consideration. In addition, a list of 78 health facilities and other county infrastructure such as ward and sub county offices were added to the datasets for an extensive analysis and development of a comprehensive deployment plan. Below is a list and distribution of these schools across the county.

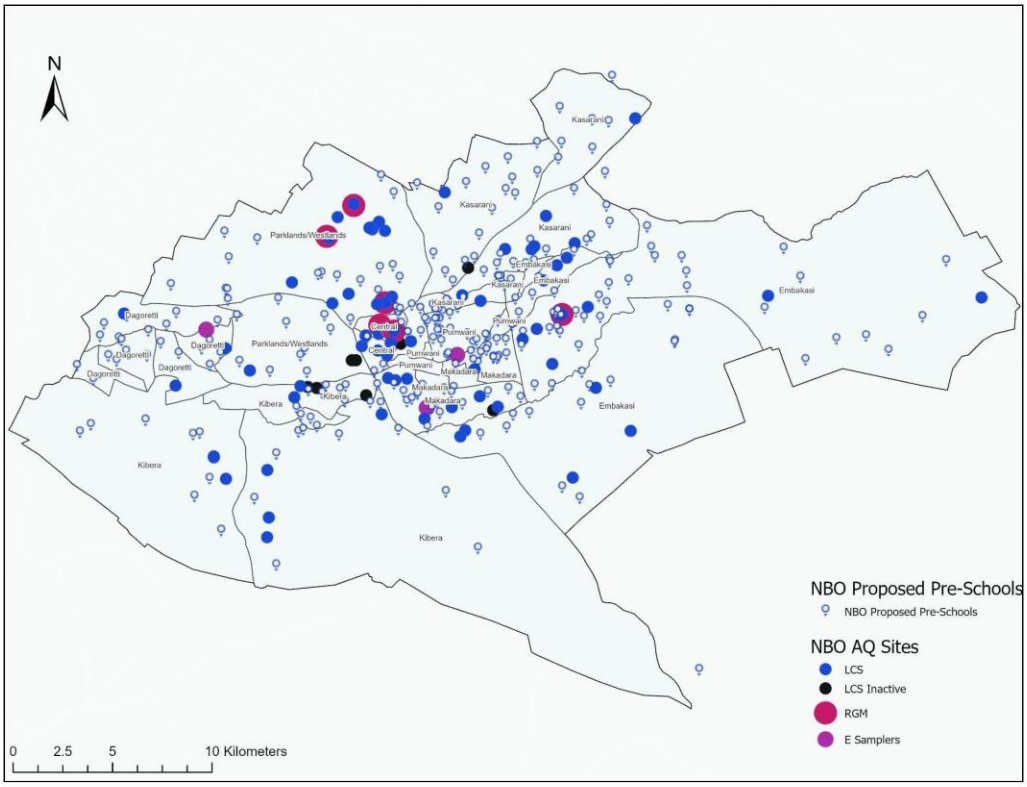

Figure 5. Map of Nairobi City County Government indicating the distribution of third party air quality monitoring infrastructure and proposed pre-schools for deployment of LCS

The table below shows the distribution of LCS and pre-schools across the 17 NCCG sub counties. Initial mapping and analysis indicate that approximately 40 wards have no known air quality monitor. At least 10 other wards require additional monitors deployed because of larger population density or the size of the wards are bigger. The table below summarizes the distribution of pre-selected schools, proposed number of monitors to be deployed and number of wards considered in every sub county.

Table 2. Distribution of sites across wards in Nairobi City County

Sub County	Wards	Pre-Schools	Monitoring Stations	Additional LCS
Dagoretti North	2	14	1	3
Dagoretti South	4	14	1	5
Embakasi East	3	8	0	5
Embakasi Central	1	8	0	2
Embakasi North	1	9	3	0
Embakasi South	1	4	5	0
Embakasi West	1	16	5	0
Kamukunji	7	12	0	8
Kasarani	3	16	2	4
Kibra	5	9	1	8
Langata	2	13	4	2
Makadara	9	29	6	7
Mathare	1	7	1	1
Roysambu	3	14	2	4
Ruaraka	2	7	2	2
Starehe	7	28	12	3
Westlands	9	18	16	11
Grand Total	**61**	**226**	**61**	**65**

3. Site Selection

Figure 6 below shows a map of the sites considered for visit. The blue location icons are active monitoring stations. The 86 locations in red were pre-selected as potential sites for deployment of the monitors while the other locations are secondary sites for consideration.

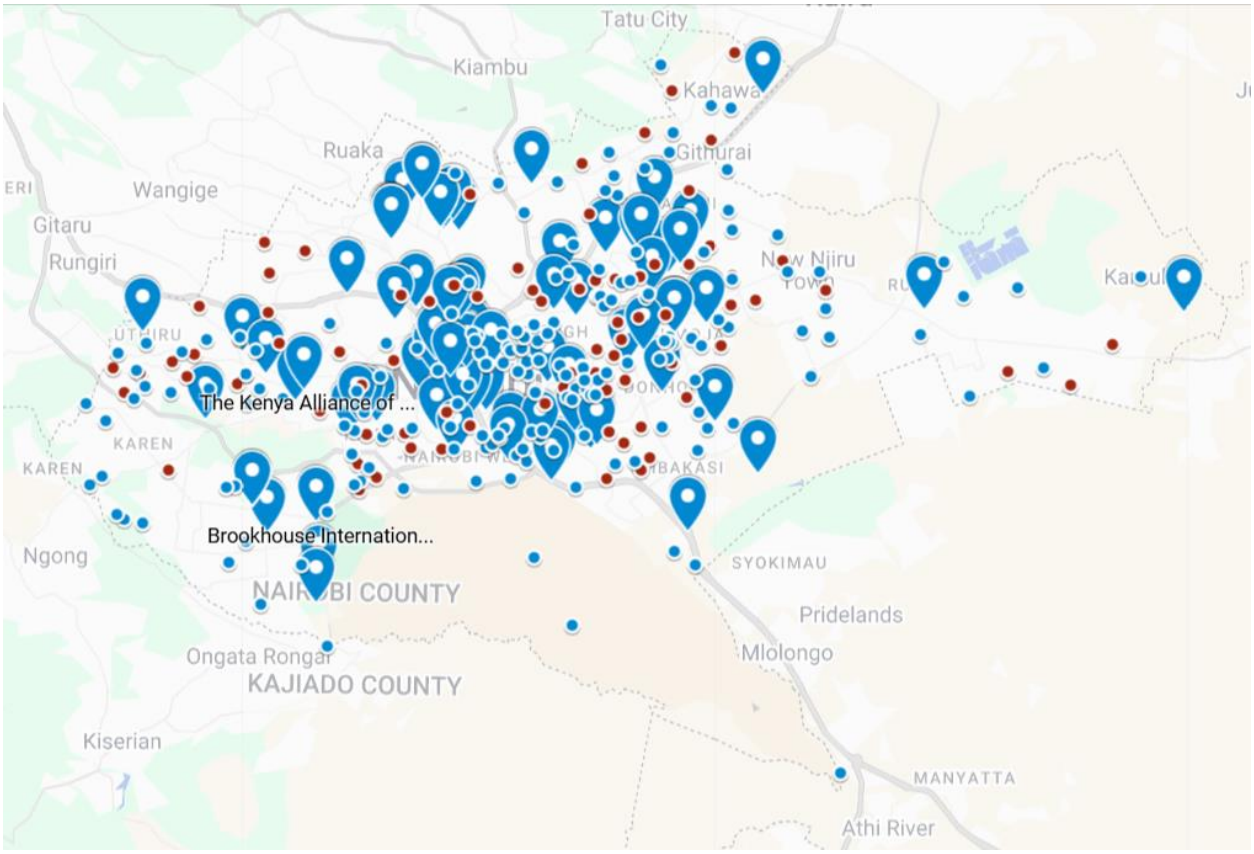

Figure 6. Map of pre-selected sites for monitoring and active stations

For optimal development of the deployment plan, we divided the preselected sites into three cohorts. Cohort 1 and Cohort 2 represent sub counties with high and medium demand for air quality monitors and sharing borders. Cohort 3 represents regions within central Nairobi that are highly urbanised, busy and densely populated. Two teams with representatives from NCCG and AQS visited all the 86 sites with the 4 allocated days distributed across two weeks.

Table 3. Site visit plan

Team	Cohort 1	Cohort 2	Cohort 3	Target
Team I	Mathare, Ruaraka,	Embakasi	Kamukunji	30 Sites

	Roysambu, Kasarani			
Team II	Dagoretti,Westlands	Kibra, Lang'ata, Makadara	Starehe	30 Sites

Site visit exercise led to the selection of 53 of the 86 preselected sites as ideal locations for deployment of low cost monitors. Out of the 53, around 44 sites will be considered for deployment of LCS excluding the 6 devices used for permanent collocation. Below is a table containing description of at least 30 sites and some images of the site visits:

Coordinates	**Site Name**	**Sub county**	**Classification**
POINT (36.807923 -1.261804)	Visa Oshwal pre-school	Westlands	Residential
POINT (36.79748 -1.258827)	Westlands pre-school	Westlands	Residential
POINT (36.871522 -1.260517)	Valley Bridge pre-school	Mathare	School
POINT (36.788553 -1.327788)	Uhuru Gardens Pre-school	Langata	Residential
POINT (36.871668 -1.260022)	Salama Pre-School	Mathare	Residential
POINT (36.783556 -1.312394)	Raila Education Centre	Kibra	Residential
POINT (36.939215 -1.246999)	Njiru Pre-school	Kasarani	Residential
POINT (36.887982 -1.199618)	Njathaini Pre-school	Roysambu	School
POINT (36.747706 -1.266041)	New Kihumbuini Pre-school	Westlands	Residential

POINT (36.781226 -1.295731)	Milimani Pre-school	Dagoretti North	Commercial
POINT (36.849853 -1.2622473)	Mathari Pre-school	Mathare	Residential
POINT (36.864519 -1.210754)	Marurui pre-school	Roysambu	Residential
POINT (36.898475 -1.18397)	Mahiga pre-school	Roysambu	Residential
POINT (36.816309 -1.308726)	Madaraka pre-school	Langata	Residential
POINT (36.812377 -1.316545)	Langata Road pre-school	Langata	Commercial
POINT (36.781486 -1.331445)	Langata police ECDE center	Langata	Residential
POINT (36.782712 -1.292874)	Kilimani preschool	Dagoretti North	Residential
POINT (36.784314 -1.309698)	Kibra preschool	Kibra	Residential
POINT (36.903941 -1.220852)	Kasarani preschool	Kasarani	Residential
POINT (36.893547 -1.171602)	Kamiti preschool	Roysambu	School
POINT (36.722339 -1.26375)	Kabete Vetlab preschool	Westlands	Residential
POINT (36.8186666 -1.256086)	Highridge preschool	Westlands	Residential
POINT (36.871668 -1.260022)	Githurai preschool (chief's camp)	Roysambu	Residential

POINT (36.752302 -1.277329)	Gatina preschool	Dagoretti North	Residential
POINT (36.877317 -1.253648)	Garden Estate preschool	Roysambu	School
POINT (36.871522 -1.260517)	Daima preschool	Mathare	School
POINT (36.74313 -1.279744)	Dagoretti muslim preschool	Dagoretti North	Residential
POINT (36.903941 -1.220852)	Chieko preschool	Kasarani	School
POINT (36.776721 -1.308355)	Ayany	Kibra	Residential
POINT (36.887314 -1.209681)	Mirema	Kasarani	Residential

Figure 7. Site visit images

4. Network deployment plan

The map below shows the existing network of monitors (green) shared on the NCCG website with additional locations mapped out for placement of the LCS. This map contains over 53 sites considered as potential locations for LCS. However, due to the required field collocation of 6 LCS, only 44 of the 53 sites will be considered for single deployment.

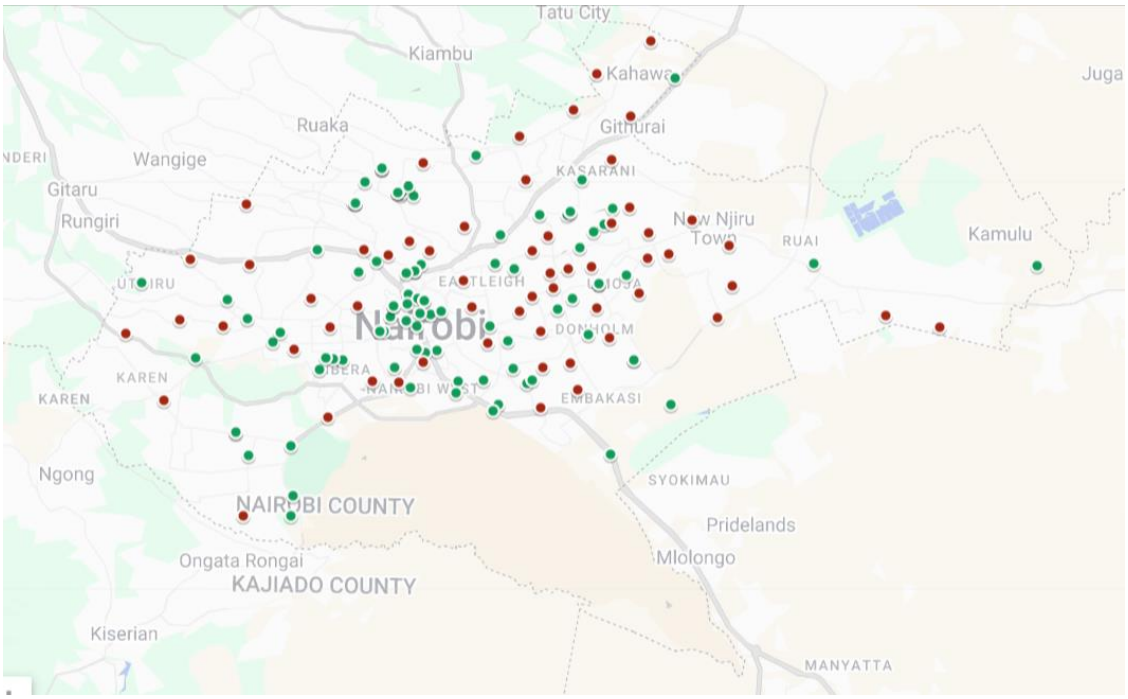

Figure 8. Preselected sites for monitoring and active stations

4.1 Deployment schedule

The deployment schedule defined below follows the network needs considerations for every sub county defined in table 2.

Table 4. Deployment schedule for the NCCG

Day	Team I	Team II
1	Roysambu, Kasarani	Westlands
2	Ruaraka, Mathare	Dagoretti
3	Embakasi East, Central	Kibra
4	Embakasi West, North, South	Lang'ata, Makadara
5	Kamukunji	Starehe

6	Kamukunji	Starehe

5. Conclusions

Deployment of low-cost sensors (LCSs) is guided by the objectives for air quality monitoring. In the Procurement and deployment of a comprehensive city-owned low-cost sensor AQ monitoring network project, we identified two objectives; field collocation for development of calibration models and deployment for general population exposure. In this plan, we provide guidance and information on the rationale for site selection and optimal deployment of a robust and hyperlocal network of LCSs for ambient particulate matter measurement in Nairobi City County.

For this hybrid network design with pre-deployed reference grade monitors (RGM), we proposed permanent collocation of 6 LCS across the two core sites co-owned by the World Resources Institute (WRI) and NCCG. We have also provided other considerations for siting with provision for temporal and spatial coverage of the network. Finally, the plan summarises the design of the monitoring network, site verification process and quality control through provision of maps. The comprehensive mapping exercise provides the spatiotemporal distribution of active stations and gaps to be filled by the LCSs to be deployed as part of this project main outcome.

To conclude the deployment plan, field visits conducted across 86 preselected sites led to shortlisting of 53 spatially distributed sites where at least 44 are expected to host single LCSs. This hyperlocal sensor network developed for Nairobi is crucial to determine the temporal and spatial variations in air quality across the city, and this plan clearly summarises the major steps we undertook to design the monitoring network and provide avenues for data accuracy verification and quality assurance.

6. Appendices

6.1 Site Selection Documentation

Dagoretti North

S/N	Site	Recommendations
1.	Gatina Pre-school	
2	Dagoretti Muslim Pre-School	
3	Riruta H.G.M Pre-School	
4	Kawangware Pre-School	
5	Kilimani Pre-School	
6	Milimani Pre-School	
7	St. George's Pre-School	
8	State House Pre-School	
9	Nairobi Pre-School	
10	Lavington Pre-School	
11	Muthangari Pre-School	
12	Kileleshwa Day Nursery	
13	State House Day Nursery	
14	Lady Northey Day Nursery	
15	Other county facilities (offices, health facilities etc) visited: 1. 2. 3. 4	

	5.	

Dagoretti South

S/N	Site	Recommendations
1	Gitiba Pre-School	
2	Kirigu Pre-School	
3	Mutuini Pre-School	
4	Dr. Muthiora Pre-School	
5	Kinyanjui Road Pre-School	
6	Riruta Satellite Pre-School	
7	Kabiria Pre-School	
8	Ndurarua Pre-School	
9	Dagoretti Special Pre-School	
10	Ruthimitu Pre-School	
11	Kagira Pre-School	
12	Mukarara Pre-School	
13	Nembu Pre-School	

14	Waithaka Day Nursery	
15	Other county facilities (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Embakasi East

S/N	Site	Recommendations
1	GSU Embakasi	
2	Embakasi Garrison Pre-School	
3	Utawala Academy	
4	Embakasi Pre-School	
5	Edelvale Pre-School	
6	Maua Pre-School	
7	Mihang'o Pre-School	
8	Donholm Pre-School	
15	Other county facilities	

	(offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Embakasi Central

S/N	Site	Recommendations
1	Kayole North Pre-School	
2	Bondeni Pre-School	
3	Imara Pre-School	
4	Kayole Pre-School	
5	Thawabu Pre-School	
6	Mwangaza Pre-School	
7	Komarock Pre-School	
8	Komarock South	
9	Other county sites (offices, health facilities etc) visited: 1.	

	2. 3. 4 5.	

Embakasi North

S/N	Site	Recommendation
1	Dandora I Pre-School	
2	James Gichuru Pre-School	
3	Tom Mboya Pre-School	
4	Wangu Pre-School	
5	Ronald Ngala Pre-School	
6	Ushirika Pre-School	
7	Kariobangi North Pre-School	
8	Wamura Pre-School	
9	Dandora Day Nursery	
10	Other county sites (offices, health facilities etc) visited: 1. 2.	

	3. 4 5.	

Embakasi South

S/N	Site	Recommendations
1	Kwa Njenga Pre-School	
2	A.E.F Reuben Pre-School	
3	Mukuru Community Centre	
4	Our Lady of Nazareth	
5	Other county facilities (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Embakasi West

S/N	Site	Recommendation
1	Kariobangi South Pre-	

	School	
2	Buruburu I Pre-School	
3	Nairobi River Pre-School	
4	Uhuru Estate Pre-School	
5	Supaloaf Pre-School	
6	Unity Pre-School	
7	Kifaru Pre-School	
8	Busara Pre-School	
9	Peter Kibukosya Pre-School	
10	Umoja I Day Nursery	
11	Mugumo Day Nursery	
12	Simba Day Nursery	
13	Unity Day Nursery	
14	Mwangaza Day Nursery	
15	Other county facilities (offices, health facilities etc) visited: 1.	

	2. 3. 4 5.	

Kamukunji

S/N	Site	Recommendation
1	New Pumwani Pre-School	
2	New Eastleigh Pre-School	
3	Zawadi Pre-School	
4	Heshima Road Pre-School	
5	Muthurwa Pre-School	
6	St. Terresa's Boys	
7	O LM Pre-School Shauri Moyo	
8	Eastleigh Airport Pre-School	
9	Shauri Moyo Day Nursery	
10	Pumwani Day Nursery	
11	Shauri Moyo Day Nursery	

15	Other county facilities (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Kasarani

S/N	Site	Recommendations
1	Kasarani Pre-School	
2	Jehovah Jireh Pre-School	
3	Chemichemi Pre-School	
4	Njiru Pre-School	
5	Mirema Pre-School	
6	St. Dominic's Pre-School	
7	Ng'undu Pre-School	
8	Ruai Pre-School	
9	Njiru Town Day Nursery	

10	Gituamba Pre-School	
11	Athi Pre-School	
12	Drumvale Pre-School	
13	KamuluDay Nursery	
14	Manyatta Pre-School	
15	Mwiki ECDE	
16	Chieko Pre-School	
17	Other county facilities (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Kibra

S/N	Site	Recommendations
1	Kibera Pre-School	
2	Raila Education Centre Pre-School	
3	Ayany	

4	Mbagathi Road Pre-School	
5	Jamhuri Pre-School	
6	Shadrack Kimalel Pre-School	
7	Toi Pre-School	
8	Joseph Kang'ethe Pre-School	
9	Upper Hill Day Nursery	
10	Other county sites (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Lang'ata

S/N	Site	Recommendation
1	Ngong' Forest Pre-School	
2	Karen 'C' Pre-School	
3	St. Mary's Pre-School-Karen	

4	Lang'ata Road Pre-School	
5	Jamhuri Pre-School	
6	Uhuru Gardens Pre-School	
7	Ngei Pre-School	
8	Langata West Pre-School	
9	Nairobi West Day Nursery	
10	Madaraka Pre-School	
11	Langata Police ECD Centre	
12	Joash Olum ECD Centre	
13	Langata Barracks	
14	Other county sites (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Makadara

S/N	Site	Recommendations
1	Bidii Pre-School	
2	Bakara Pre-School	
3	Harambee Pre-School-Karen	
4	Ofafa Jericho Pre-School	
5	Rabai Road Pre-School	
6	Joseph Apudo Pre-School	
7	Kaloleni Pre-School	
8	Makongeni Pre-School	
9	St. John's Pre-School	
10	Canon Apolo Pre-School	
11	Jogoo Road Pre-School	
12	Martin Luther Pre-School	
13	St. Michael's Pre-School	
14	St. Patrick's Pre-School	
15	St. Paul's Pre-School	

16	Dr. Krapf Pre-School	
17	Dr. Livingstone Pre-School	
18	Kimathi Estate Pre-School	
19	Morrison Pre-School	
20	Bahati Pre-School	
21	St. Anne's Pre-School	
22	Star of Hope Pre-School-Lunga Lunga	
23	St. Elizabeth Pre-School	
24	Ofafa Day Nursery	
25	Tana Crescent Day Nursery	
26	Njoro Close Day Nursery	
27	Bahati Day Nursery	
28	Kaloleni Day Nursery	
29	Mbotela Day Nursery	
30	Other county sites (offices, health facilities etc) visited: 1. 2.	

	3. 4 5.	

Mathare

S/N	Site	Recommendation
1	Mathari Pre-School	
2	Huruma Pre-School	
3	Salama Pre-School	
4	Daima Pre-School	
5	Ndururuno Pre-School	
6	Valley Bridge Pre-School	
7	Kiboro Pre-School	
8	Other county sites (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Roysambu

S/N	Site	Recommendation
1	Thika Road Pre-School	
2	Muthaiga Pre-School	
3	Githurai Pre-School	
4	Kahawa Pre-School	
5	Kenyatta University Pre-School	
6	Mahiga Pre-School	
7	Kiwanja Pre-School	
8	Garden Estate Pre-School	
9	Roysambu Pre-School	
10	Njathaini Pre-School	
11	Marurui Pre-School	
12	Kamiti Pre-School Nursery	
13	Other county sites (offices, health facilities etc) visited: 1. 2. 3.	

	4 5.	

Ruaraka

S/N	Site	Recommendation
1	Daniel Comboni Pre-School	
2	Ngunyumu Pre-School	
3	Mathare North Pre-School	
4	Heidemarie Mathare 4A Pre-School	
5	Drive-in Pre-School	
6	Baba Dogo Pre-School	
7	M.M Chandaria Pre-School	
8	Other county sites (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Starehe

S/N	Site	Recommendation
1	Pumwani Pre-School	
2	Islamia Pre-School	
3	Mathare North Pre-School	
4	Moi Avenue Pre-School	
5	Mariakani Pre-School	
6	Nairobi South Pre-School	
7	Plainsview Pre-School	
8	Park Road Pre-School	
9	City Pre-School	
10	Riverbank Pre-School	
11	Parklands Pre-School	
12	Ainsworth Pre-School	
13	Juja RoadPre-School	
14	Pangani Pre-School	
15	Racecourse Pre-School	
16	Muslim Pre-School	

17	Dr. Aggrey Pre-School	
18	Mukuru Kayaba Pre-School	
19	St. Bakhita Pre-School	
20	St. Catherine's Pre-School	
21	St. Brigid's Pre-School	
22	CGHU	
23	SSD	
24	ARYA	
25	Starehe Day Nursery	
26	Ziwani Day Nursery	
27	Central Nursery	
28	Ngara East Day Nursery	
29	Other county sites (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

Westlands

S/N	Site	Recommendation
1	Karura Pre-School	
2	Cheleta Pre-School	
3	Kabete Vet Lab Pre-School	
4	Loresho Pre-School	
5	Lower Kabete Pre-School	
6	Farasi Lane Pre-School	
7	Hospital Hill Pre-School	
8	Aga Khan Pre-School	
9	Highridge Pre-School	
10	North Highridge Pre-School	
11	Visa Oshwal Pre-School	
12	Westlands Pre-School	
13	Bohra Pre-School	
14	Muguga Green Pre-School	
15	Parklands Day Nursery	
16	Kangemi Pre-School	

17	New Kihumbuini Pre-School	
18	Other county sites (offices, health facilities etc) visited: 1. 2. 3. 4 5.	

6.2 Site Specifications Template

SITE SPECIFICATIONS		
SITE NAME		
SITE NUMBER/ID		
SITE ADDRESS		
SUB COUNTY, WARD		
SITE COORDINATES	LATITUDE (DECIMAL DEGREES)	LONGITUDE (DECIMAL DEGREES)
ELEVATION		
LIST OF MONITORED POLLUTANTS		
DISTANCE TO NEAREST ROADWAY	NEAREST	
SITE CLASSIFICATION		
URBANIZATION	• LARGE • MEDIUM • NON-URBAN • SMALL	
NEIGHBOURHOOD POPULATION	• <500 • 500-9, 999 • 10,000-49,000 • 50,000-99,999 • 100,000-149,000 • >149,000	
LOCAL LAND USE	• RESIDENTIAL • COMMERCIAL • AGRICULTURAL • INDUSTRIAL • OPEN • PARKS • FORESTED • WATER	
SITE TYPE	• GENERAL POPULATION EXPOSURE • POINT SOURCE-INFLUENCED • REGIONAL BACKGROUND	

	• TRANSPORTATION-SOURCE INFLUENCED
PROVIDE A MAP SITE AND SORROUNDING TERRAIN AND FEATURES	
PROVIDE RECENT SITE PHOTOGRAPHS (ALL QUADRANTS FROM THE SITE AND LOOKING AT THE SITE)	
COMMENTS:	

6.3 Network Documentation

NETWORK DOCUMENTATION			
Are each of the following site requirements documented in a network-monitoring plan or otherwise available as official records?			
	YES	**NO**	**COMMENT**
Street address and geographic coordinates?			
Monitored pollutants			
Photographs of each site?			
Start-up and recall dates?			
Documentation of instrumentation and maintenance records?			
Who has custody of current network documents?	Name: Title:		
How often is network siting reviewed?	Frequency:		
Comments:			