

Comprehensive Source Apportionment Study for Johannesburg

Request for Proposals (RfP)

August 2024

1. Background

The City of Johannesburg stretches approximately 60 km from North to South and 30 km from West to East, spanning more than 1600 km². The City has eight (8) ambient air quality monitoring stations strategically located in Alexandra, Orange Farm, Davidsonville, Ivory Park, Jabavu, Diepsloot, Buccleuch, and Delta Park. These stations are situated in a variety of settings, including townships and urban areas, with the Buccleuch station specifically monitoring traffic-related air quality.

The effective management of air pollutant emissions within the City of Johannesburg requires a comprehensive source apportionment study to assist the city to have a clearer understanding of exactly which sources are the cause of pollutant emissions and air quality problems. The identification of air pollution hotspots, by better understanding the contribution of air pollutant emission sources will help the city target its interventions and policies more efficiently. The city's Air Quality Management Plan (AQMP) was finalised in 2019. This AQMP made use of high-level source apportionment work, which entailed a modelling exercise, but to date, a comprehensive source apportionment study has not been done in Johannesburg, and as such there are data gaps in understanding the causes of pollutant emissions and areas that are highly exposed. The AQMP is currently under revision; therefore, the proposed project will be a key policy informant to this revision.

The Clean Air Fund (CAF) is currently accepting proposals for a service provider to conduct a comprehensive source apportionment study for Johannesburg. The outcomes and results from this comprehensive source apportionment study will provide a repository of credible data and information that can be used more widely in policy making at the city level. A large portion of the city's air pollutant emissions are generated outside of the city's geographic boundaries; therefore, the proposed study will assist in determining the source contribution of the various air pollutants within the city's boundaries and inform approaches to manage cross-boundary air pollution.

Background to Clean Air Fund

Launched in 2019, the Clean Air Fund is a philanthropic initiative with a mission to tackle air pollution around the world. Our aim is to help build and support a powerful global movement for clean air. We achieve this by bringing together funders, researchers, policy makers and campaigners working on a wide range of issues to find and scale solutions that will provide clean air for all. More information about the Clean Air Fund can be found on our website: www.cleanairfund.org

2. Project Purpose & Scope

The comprehensive source apportionment study for Johannesburg will provide high resolution data that specifically targets the contribution of sources to concentrations of PM₁₀, PM_{2.5}, NO₂ and SO₂ in Johannesburg. The study aims to provide the city with data that will support air quality policy implementation. By the end of this project the following questions should have been answered:

- a) What are the different sectors that contribute to different air pollutants over Johannesburg and to what extent?
- b) How much of these emissions are coming from outside of the city and how much is formed inside of the city area.

The proposed Comprehensive Source Apportionment Study should build on previous studies on emission inventory and receptor modelling that have been that cover the City of Johannesburg. These include but not limited to:

- 2016 City of Joburg emission inventory developed as part of 2019 AQMP.
- Vaal Triangle Airshed Priority Area Source apportionment studies.
- World Bank funded pollution management and Environmental Health Pilot project source apportion study and emission inventory.

CAF would like to Request for Proposals from experienced technical consultants/service provider who can deliver on the proposed work as detailed above and below in Section 4. The work packages below are proposed and should be expanded on or edited based on consultants suggested approach.

3. Work Packages

Work Package 1: Inception meeting/project planning

This is an important meeting between the selected Service Provider/ technical consultant and the Client (CAF). The service provider will create a project inception report, including a Project Plan with an outline of activities, roles and responsibilities and timeframes for discussion. The service provider will convene and moderate the meeting. City staff will attend and participate in creating an outline of activities, roles and responsibilities and timeframes that are mutually agreed to. The project plan would need to include a detailed methodology that unpacks the full approach to delivering on this work as outlined in the packages below. The project plan would need to provide a detailed sampling plan for Work Package 2 that includes sampling approach such as: identification of sampling sites; number of samples; sampling seasons, etc.

Expected Activities

- Create an inception report, including a Project plan with an outline of activities, roles and responsibilities, and timeframes.
- Finalize the methodology/ approach based on feedback from project team.

Deliverable 1: Inception report that includes a final methodology.

Work Package 2: Ambient air quality sampling and analysis

Conduct ambient air quality sampling according to the agreed upon methodology, to provide data on the state of the air. Primary data collection should be done seasonally (at least two most polluted season) especially for sectors with known seasonal variation. To conduct a comprehensive source apportionment study, any source apportionment samplers would need to be co-located at the existing monitoring sites. This approach leverages the established infrastructure and data streams for an integrated analysis of air pollution sources.

Deliverable 2: Sampling campaign report detailing sampling sites, dates, duration and data recovery

Deliverable 3: Sample analysis (gravimetric, carbonaceous fractions, molecular marker; elemental and ions) results report

Work Package 3: Gridded Emissions Inventory

Prepare an inventory for different air pollutants (PM₁₀, PM_{2.5}, NO₂, SO₂), their emission rates & pollution loads from various sources along with spatial and temporal distribution in the city. This should be a gridded (2*2km) emission inventory and done through primary survey and secondary data available for the city. Sectors to be considered (non-exhaustive list) - road dust, vehicle, industry, construction and demolition, waste burning, open area dust, domestic, hotel and restaurant, diesel generators, mines, etc.

For emission factors, locally available emission factors need to be scanned and used if available. A representative survey for several sectors like road dust, construction, vehicular, waste, domestic etc. should be done. Seasonal sources such as burning should be addressed.

Deliverable 4: Comprehensive gridded emissions inventory report detailing methodology and assumptions used to estimate emissions and all the necessary supporting documentation.

Work Package 4: Receptor Modelling for PM10 and PM2.5

Index, measure, model, and profile all sources of air pollution in Johannesburg through the deployment of samplers with the aim of building on existing air quality data and the current evidence base.

Expected Activities:

- Multiple receptor sites should be selected in consultation with CAF and these sites should be representative of different micro-environments such as commercial, residential, industrial, background etc. At least 7-10 sites should be selected.
- Per site, at least 30-35 samples should be collected per season. Source apportionment should be done for at least two seasons (most polluting) if not more.
- Chemical composition analysis should be done for water soluble inorganic species (SO₄²⁻, NO₃⁻, Na⁺, Cl⁻, K⁺, Ca²⁺, NH₄⁺ and Mg²⁺), elements (including metals), elemental and organic carbon and well-known molecular markers for different combustion sources. In addition, gravimetric analysis should be done for each sample as well.
- Chemical Mass Balance or Positive Matrix Factorization should be used for receptor modelling.

Deliverable 5: Report that details sources for PM10 and PM2.5 along with detailed methodology and assumptions used to estimate sources and the necessary supporting documents.

Work Package 5: Dispersion Modelling

Ideally an atmospheric chemical transport model that accounts for secondary formation of aerosol (e.g. – WRF-Chem, WRF-CMAQ etc) should be used for dispersion modelling. The goal of the dispersion modelling is to a) validate the results from the receptor modelling and b) identify inside vs regional contribution of PM10 and PM2.5. The model should be run during the period of sampling and data collection. For emission outside the city domain, global inventories should be used (if regional inventories are unavailable). In absence of chemical transport model facility, potential grantee can also propose dispersion modelling using traditional Gaussian based models (ISCST3, AERMOD etc). The model output should be verified with ground-based monitor data to grossly estimate the contribution from regional transport.

Deliverable 6: A report on results from dispersion modelling, ideally separated by sectors and contributions from outside and inside of the city.

Work Package 6: Data Management / Reporting

Ensure that detailed data is available to the city government, public and campaign groups describing different pollution sources in the city and their relative impacts on pollutants concentrations.

Expected Activities

- Build a repository of high-quality, high-resolution data and information that is credible.
- Publish data on pollutant concentrations, emissions sources in format accessible to the public and city policymakers such as a publicly accessible website.

- Development of a web-based interactive visualization tool on results from emission inventory and receptor modelling.
- Recommendation for the city on source reduction pathways.
- Conduct an event engaging multiple stakeholders and citizens on the dissemination of results and inauguration of the web-based tool.

Deliverable 7: Visualisation of the data output from this project in an online GIS based data tool (see example [IIT Kanpur](#))

Deliverable 8: Final Report on the comprehensive source apportionment for Johannesburg pulling together the chapters from the other Work Packages into one.

Work Package 7: Capacity Development

The overall project approach is to increase the city official and its stakeholder's capacity to develop source apportionment studies and improve capacity to resolve technical issues, allowing for greater and more reliable air quality data collection and dissemination. To facilitate this, the service provider will be required to provide a plan of how they intend to ensure that this is done in the project.

Expected Activities

- Detailed capacity development plan for city air quality officials and stakeholders.
- Building capacity through training workshop amongst the city core air quality staff in effectively processing and using the data outputs to identify and priorities actions/intervention for implementation.

Deliverable 9: Detailed capacity development plan for city air quality officials and stakeholders.

Deliverable 10: Capacity Development Report with supporting documentation (attendance registers, etc.)

Ongoing across all activities is frequent engagement with CAF and other core partners (such as City of Johannesburg and C40). A steering committee will be established by the City and the service provider will be required to provide reporting to this committee throughout the project.

4. Proposal Guidelines

This Request for Proposals represents the requirements for an open and competitive process.

Proposals should be limited to 20 pages (front and back) and include:

- **Methodology:** How the bidder will approach the project.
- **Work Plan & Timeline:** A timeline indicating the different stages, milestones, and contact moments with CAF – adequate review periods should be included.
- **Budget:** An itemized breakdown of costs in USD and ZAR for each project task (see Section 6 below for budget details).
- **Risk Management Approach:** Description of any risks and assumptions made in planning this work along with appropriate management and mitigation strategies. Details on how a risk assessment would be completed and what that would include.

Bidders are encouraged to include the following documents (and any other relevant documentation) in Annexes:

- **Organisational Profile & Key Staff:** Details of the organisation and proposed project team – please include relevant experience and expertise, limiting CVs to two pages per person.
- **References:** At least two recent references with phone and email contact details.

Proposals from consortiums of different institutions are welcome, however consortiums are encouraged to ensure that they clearly articulate who will deliver on the different work packages.

Proposals will be accepted until **30 August 2024**. Any proposals received after this date and time will not be accepted and will be returned to the sender.

If the organisation submitting a proposal must outsource or contract any work to meet the requirements contained herein, this must be clearly stated in the proposal.

Additionally, all costs included in proposals must be all-inclusive (inclusive of tax if applicable) to include any outsourced or contracted work. Any proposals which call for outsourcing or contracting work must include a name and description of the organisations being contracted. Contract terms and conditions will be negotiated upon selection of the winning bidder for this Request for Proposal (RfP). All contractual terms and conditions will be subject to review by the CAF legal department and will include scope, budget, schedule and other necessary items pertaining to the project.

Bidders located in South Africa are preferred; bidders outside South Africa are encouraged to find a local partner to build local capacity and minimise travel costs and carbon emissions.

5. RfP and project timeline

A briefing session will be held on the **12th of August 2024, at 2pm SAST**, bidders who would like to attend this session are requested to email: ndubazane@cleanairfund.org to register for the session. Bidders are welcome to share questions before the session, and these will be addressed during the session. The deadline for submission of proposals is end of day 30 August 2024. Proposals must be submitted via email to ndubazane@cleanairfund.org

ACTIVITY DATE	DEADLINE
Request for Proposals published	07 August 2024
Briefing Session with bidders	12 August 2024
Deadline for proposals	30 August 2024
Review of proposals, call with front runners (if needed) and decision on preferred bidder.	05 September 2024
Proposal finalisation, and agreement	10 September 2024
All bidders notified of outcome	10 September 2024
Project start	October 2024 / As soon as contract is signed
Deadline for completing the work	30 June 2026

Please note that these dates are to be used as a guide and are subject to change. The expected start date for the project is **October 2024 and end date is June 2026**.

The final reports are to be submitted in both word and PDF formats. Associated files such as spreadsheets must also be submitted in soft copy.

6. Project budget

The total contract amount for this project is **USD 300,000** including all applicable taxes. No proposal above USD 300,000 will be accepted. **The quote should also include cost per sample site for receptive modelling. Note that all costs should be included, (taxes, tools, equipment, transportation, meals, accommodation etc.), as the budget above represents the total amount available.** All budgets are to be prepared in **USD and ZAR**, (please list exchange rate used). The contracting entity will be Clean Air Fund.

Payment will be made periodically based on the satisfactory completion of the deliverables and the payment schedule will be agreed upon during the contract negotiation stage.

7. Proposal evaluation criteria

The proposals will be evaluated against the criteria in the table below. The contract will be offered to the bidder with the highest overall score.

EVALUATION CRITERIA	PERCENTAGE
Project plan, interpretation of brief and identified timelines/milestones: is the timeline realistic? Is it tailored to the requirements in the RfP?	25 %
Management plan and key personnel: is the risk management approach realistic? Are there mechanisms for raising issues? Track record of key personnel?	15%
Expertise on capacity building: is there relevant, similar experience? Is the team qualified?	5%
Technical expertise on Air quality Management, Source Apportionment Study, Atmospheric Chemistry, Atmospheric Modelling and Atmospheric Emission Inventory Development and professional references: Does the proposal show mastery of subject expertise?	35 %
Budget: Are the fees competitive? Is the budget breakdown clear?	20 %

8. Submissions

Each bidder must submit 1 copy of their full proposal with Annexes to the following point of contact by **30 August 2024. Nokuthula Dubazane, Clean Air Fund,** ndubazane@cleanairfund.org.

9. Terms and Conditions

CAF reserves the right to change or cancel the above requirements at any time, without incurring any liability towards any interested party and/or any obligation to inform any interested party of the grounds for its action. All costs incurred in connection with the submission of this RfP are non-refundable by Clean Air Fund.