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CASE STUDY

Using data to strengthen electricity asset maintenance in Cape Town

How the City of Cape Town used spatial data analytics to significantly reduce sub-station break-downs and power outages.

At a glance

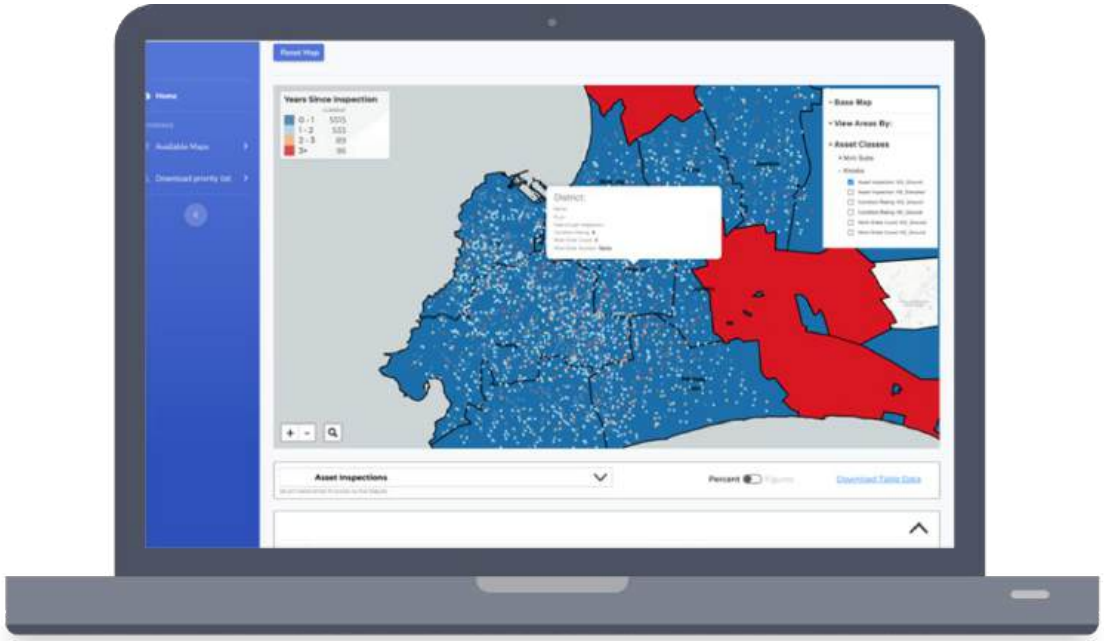
MUNICIPALITY
City of Cape Town

DIRECTORATE
Energy Directorate

TOOL
Spatial Data Analytics Tool

PRIMARY USERS

District coordinators, maintenance planners, medium-voltage superintendents and electricity asset management officials



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At a glance

THE CHALLENGE	Electricity infrastructure maintenance was difficult to prioritise because existing data was too fragmented for officials to easily see which assets had been missed or neglected.
KEY RESULT	Missed inspections reduced from more than 60 assets to only 1 in a six-month period after implementation. Reactive “no power” maintenance orders reduced by 30.5% between 2024 and 2026. Asset neglect is no longer concentrated in socio-economically vulnerable areas.
MAIN LESSON	When trusted data is made visible and embedded in operational workflows, municipalities can move from reactive maintenance towards more proactive, risk-based infrastructure management.

The approach

The approach focused on turning existing asset and maintenance data into a clearer spatial view for officials responsible for inspection, maintenance and planning. Instead of requiring teams to work through dense lists and manual analysis, the approach aimed to make maintenance gaps easier to interpret and act on.

The tool was built around existing municipal systems and co-developed with CCT officials from the start, rather than introduced as a standalone solution from outside the municipality. This helped ensure that it responded to operational needs, supported existing workflows, drew on internal capability, and could be promoted and sustained within the City's own environment.

The work also brought resident impact into the analysis by integrating socio-economic vulnerability data, allowing the City to assess whether neglected assets were concentrated in more vulnerable areas.

Context

This work was supported through a strategic partnership between the UK Foreign, Commonwealth & Development Office (FCDO), the City of Cape Town (CCT), and Open Cities Lab (OCL).

The work builds on foundations laid through the Future Cities Programme South Africa and the Urban Resilience Programme. It reflects a collaborative approach to municipal digital transformation, combining FCDO support, CCT's institutional ownership and operational drive, and OCL's technical and advisory support.

The CCT's Energy Directorate provides one of the programme's strongest success stories, with clear evidence of directly improving local service delivery, improving resident livelihoods and increasing the resilience of city institutions, spaces and residents. This case study reflects on the process in designing and implementing this use case.

The challenge

Electricity infrastructure needs regular inspection and maintenance to remain safe and reliable. When asset inspections are missed for long periods, the risks can build quickly: costly reactive repairs, premature asset failure, power outages and safety hazards. This has direct bearing on the ability of the city to safeguard its power grid and ensure uninterrupted affordable electricity for all households.

Before this use case, officials in the City of Cape Town's Energy Directorate did not have a simple way to see which substations were being routinely inspected and in which areas. Officials had to work through dense lists and manual processes to understand where maintenance attention was needed. This made it harder to identify and prioritise high-risk assets and consequently teams could hit their overall performance targets while still bypassing challenging or high-risk sites. This not only contributed to a more reactive maintenance cycle but also masked some localized gaps in power reliability across different parts of the city.

A caveat is important: approximately two thirds of Cape Town's electricity is supplied by the City, while the remainder is supplied directly by Eskom. A disproportionate number of residents in informal areas are directly supplied by Eskom, which limits the extent to which the tool can address all electricity service inequalities across the city.

What the tool brings together

The Spatial Data Analytics Tool integrates:

- Asset master data, including where assets are located and when they were installed;
- Operational data, including when an asset was last inspected and how it was last maintained;
- Socio-Economic Vulnerability Index data, including where “Needy” or “Very Needy” communities are located spatially in the city;
- Spatial mapping, which shows the location of the infrastructure assets visually on a map

The tool highlights neglected assets as red dots on a map. This makes inspection gaps immediately visible and allows officials to identify specific assets, access relevant information, and initiate work orders more quickly

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The tool supports a shift from broad, count-based inspection management to more targeted, condition- and risk-based maintenance.

What the tool brings together

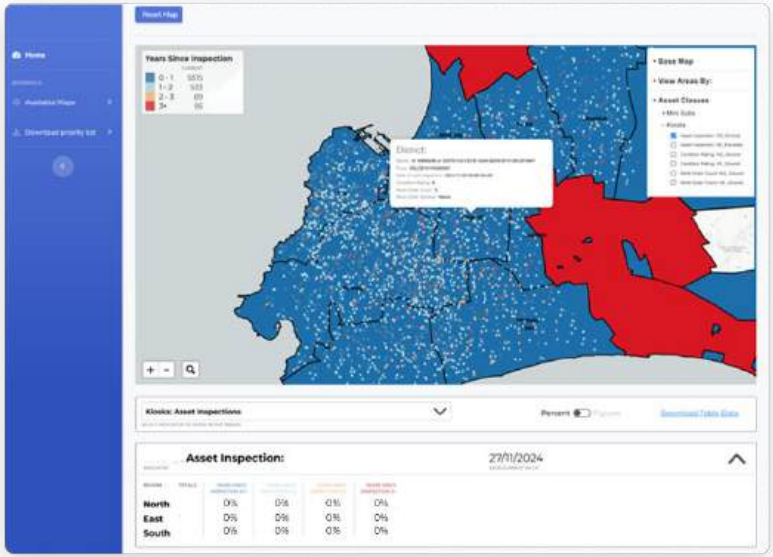

Figure 1: Spatial representation of the 2011 Socio-Economic Vulnerability Index (SEVI)

Likewise, by overlaying socio-economic vulnerability data into the tool, the team can examine to what extent neglected infrastructure is disproportionately located in “Needy” or “Very Needy” communities.

What the tool brings together

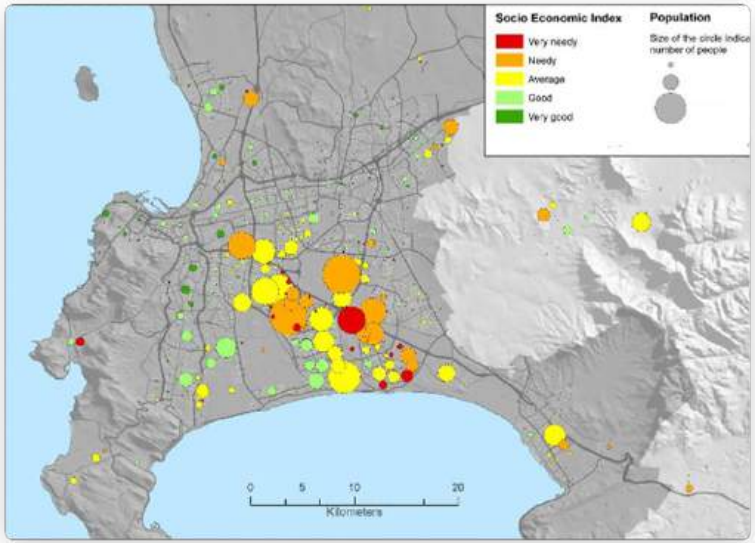

Figure 2: Spatial representation of the 2011 Socio-Economic Vulnerability Index (SEVI)

The biggest indicator [of the tool] working is in the results. When we launched it a year ago, this map was full of red dots. Now there's literally 2 red dots.

— City of Cape Town official

What changed

The tool created a clearer and more actionable view of asset maintenance gaps.

This can be directly attributed to the visibility of these neglected assets on the tool, the ease of accessing this data, and the communication of this from the EAM staff and maintenance planners to the maintenance senior superintendents.

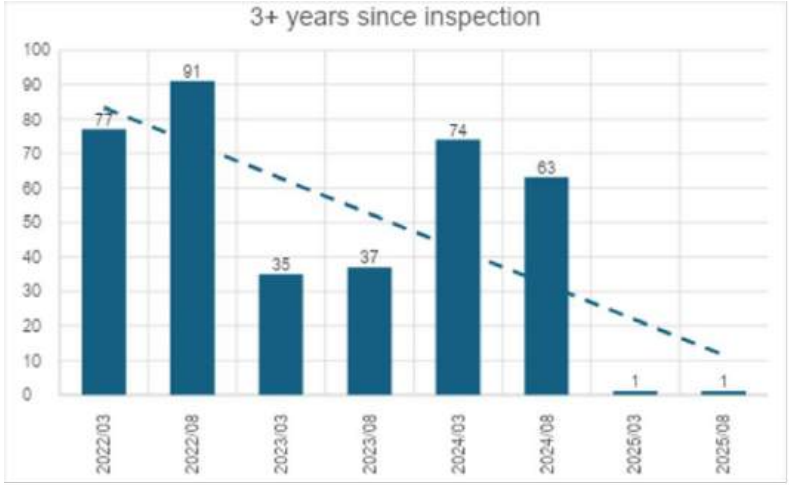

Figure 3: Number of assets in the worst inspection latency category - Mar 2022 to Aug 2025. Data supplied by CCT.

What changed

Fewer reactive outage-related maintenance orders

Use case data also shows a reduction in reactive maintenance orders for “no power” events.

Result: Reactive maintenance orders dropped from 316 in 2024 to 228 in 2026, a 30.5% reduction. This means a 30% reduction in unplanned power outages in 2 years.

This shift suggests that the CCT is moving away from reactive repairs toward a more stable, planned maintenance environment. Even if the tool is only one part of the solution, the data reflects a broader institutional trend toward operational efficiency and improved service reliability for residents.

Our decision-making cycle has been given more confidence. We’ve reduced [asset] failure risk and incident risk..

— City of Cape Town official

What changed

A shift in team behaviour

Data analytics in the tool has also transformed how the CCT manages and incentivises its teams. Previously, staff were rewarded simply for hitting a total number of inspections undertaken in a month, regardless of an asset's condition or location. This quantitative approach often left high-risk or difficult-to-reach sites neglected, at the discretion of the team.

With implementation of the tool, managers can now identify exactly which assets are consistently missed and direct inspections to those sites. This supports a more meaningful performance shift: from simply counting inspections to prioritising the right inspections.

Result: Asset neglect is no longer concentrated in socio-economically vulnerable areas. There is more uniform maintenance coverage across the city because resources are directed where they are needed most to create more reliable infrastructure and better service for all residents regardless of their location.

It changed behaviour on the ground. We're now prioritising resources where we need them most.
— City of Cape Town official

What made this possible

The success of the EAM tool was not only technical. It was supported by a strong institutional environment within the City of Cape Town.

Key enablers included the City's centralised data strategy, Data Working Group, Chief Data Officer function, internal technical capacity and long-term investment in data use. These created a stronger foundation for the tool to be developed, trusted and adopted.

Municipal ownership was also critical. CCT officials were actively involved in shaping the tool, testing its usefulness, promoting it internally and embedding it into maintenance planning. Because the tool used existing data and systems, officials could build confidence in the information and connect it to their everyday workflows.

These conditions helped the tool move beyond a technical output and become part of how officials understand and manage infrastructure risk.

There appears to be no significant difference in the location of the neglected assets [any more].
— City of Cape Town official

What still needs to happen

While the tool has shown strong results, there is still room to deepen and expand its use.
Future priorities include:

- Further institutionalising the tool across teams;
- Improving data quality and system resilience;
- Expanding the tool's functionality to additional electricity asset categories;
- Continuing internal promotion and training;
- Ensuring that the tool remains aligned with operational needs as it scales.

The City has already identified the need to strengthen data quality before expanding to more complex asset types. This reinforces an important lesson: scaling digital tools depends not only on the software, but on the reliability of the data and the capacity of the institution around it.

Lessons for scale

This case offers an important lesson for other municipalities, funders and implementation partners: data tools create the most value when they are connected to real operational decisions.

The Spatial Data Analytics Tool worked because it did not start with a technology-first question. It started with a maintenance problem that officials already understood: how to see which assets were being missed, where they were located, and how to prioritise action more effectively.

Lessons for scale

Several broader lessons stand out

- **Operational visibility can change behaviour:** When neglected assets became visible on a map, teams could move from broad inspection targets towards more targeted, risk-based maintenance.
- **Institutional readiness matters:** The tool was able to take root because it was supported by existing data foundations, internal ownership, leadership and a clear operational home.
- **Use data to test who is affected:** Infrastructure data tools should not only improve internal efficiency. They can also help municipalities examine whether service risks, maintenance gaps or asset neglect are distributed unevenly, and support more consistent service coverage over time.
- **Impact is cumulative:** Beyond the dashboard tool, the results build on years of investment in data strategy, internal capability, governance and collaboration.

Scaling requires more than replication: Other municipalities may not need the same tool, but they can learn from the method: start with a clear operational problem, build with existing data, involve the officials who will use the tool, and embed it into everyday workflows.

Lessons for scale

The wider lesson is that municipal digital transformation is about helping public officials see risks earlier, prioritise action better, and use data in the daily decisions that keep essential services working. It is not only about building new tools.

Transformation summary

Area	Before	Data-driven future
Maintenance	Reactive repairs and delayed intervention	Proactive, preventative maintenance
Data access	Dense lists, SAP digging, and manual analysis	Spatial dashboards and clearer asset visibility
Decision-making	Broad inspection counts	Targeted decisions based on condition, location, and risk
Team behaviour	Quantity-focused inspection targets	Risk-based prioritisation of neglected assets
Service equity	Risk of concentrated neglect	More uniform maintenance coverage across City-supplied areas
Public value	Higher risk of outages and asset failure	Improved service reliability and infrastructure resilience

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