

TilelessMap: A Tool for Reliable Maps in a Vulnerable World

Preface: An Open Project for a Shared Need

When your device loses signal, the map is often the first thing to disappear.

This document is an open invitation to collaborate. It addresses public agencies, researchers, tech actors and civil society interested in strengthening the digital infrastructure for geographic information in the field. TilelessMap is not a finished product, but a foundation to build upon – an attempt to connect technology, public benefit, and real-world needs.

We believe this project will grow stronger through diverse perspectives:

- Authorities contribute operational insight
- Universities provide analysis, training, and deepened understanding
- Tech companies add expertise, quality and system thinking
- The open source community offers resilience, innovation, and longevity

1. Introduction: A Map That Works When Nothing Else Does

Most map apps work great – as long as you have network coverage. But in power outages, remote areas, field work, or crisis zones, connectivity is often missing.

TilelessMap is a map engine and application built from the ground up to work entirely offline. It is designed with field conditions in mind: speed, reliability, low energy use, and openness.

If you're a forest worker, technician, or emergency responder, you need to trust your map – even when there's no cloud connection.

2. Why Modern Map Apps Fail When We Need Them Most

Modern mapping solutions often rely on pre-generated tiles or bulky text formats like GeoJSON. They generally require continuous internet access, though some allow limited downloads for offline use. This causes several issues:

- No coverage = no map (or only a small cached area)
- High battery usage due to constant redrawing
- Text-based formats struggle with large-scale data
- Tiles use a pixel-based coordinate system, making further processing or analysis impossible

TilelessMap takes another approach: vector data is stored locally in real coordinates, rendered directly, and always accessible – ready for display or future analysis.

3. Purpose and Capabilities: A Map You Always Have With You

TilelessMap already offers:

- Full offline access to maps with GPS support
- Fast rendering (typically <100 ms per view)
- Full functionality even in airplane mode
- Open-source foundation
- Extendability: future integration of analysis, editing, and processing tools

Use cases include:

- Emergency response and civil protection
 - Forestry, utility and environmental fieldwork
 - Humanitarian efforts, NGOs, and aid deployments
 - Users in regions with poor internet access or limited digital infrastructure
 - Everyday users and outdoor enthusiasts – because having an offline map is a public resilience asset
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4. How It Works – A Short Overview

TilelessMap stores geographic data in local SQLite databases. Each dataset includes:

- Spatial indexing using R-Trees
- Geometry in a compact binary format
- Styling information per layer

The app is written in C and renders directly to the GPU using OpenGL ES. No intermediate cache is used – only the current view is loaded. This results in predictable performance and very short response times. Most views render in under 100 ms (except highly zoomed-out cityscapes).

5. Examples and Field Testing

The system is also designed to be extendable. Since data retains real geometry in a normalized format, the platform can be expanded in the future with editing, analysis, syncing and context-aware processing – directly on the device.

TilelessMap has been tested with Lantmäteriet's Topo10 data covering all of Sweden. The complete vector dataset is about 6.3 GB, including all major layers. Yet the map loads instantly:

Examples:

- Zoom into a forest parcel: <40 ms render time

- Pan to a new area: <100 ms
 - No tiles, no stuttering, no cloud processing
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6. Next Steps: Collaboration and Test Environments

We are looking for:

- Contact with actors in emergency response, forestry, utility sectors
- Collaboration with universities and developers who share the vision of technology for public good
- Opportunities for funding and co-development

We see TilelessMap as a potential seed for a broader European collaboration. The EU has emphasized the need for digital resilience, technological sovereignty, and robust infrastructure. An initiative for offline geographic data access – open, efficient, and portable – aligns well with these priorities.

For this project to reach its full potential, it needs institutional anchoring: from authorities, academia, and experienced EU project participants. TilelessMap is ready – now we seek the ecosystem.

7. Contact and Closing Remarks

TilelessMap is more than just a map app – it's a platform for robust geographic information when other systems fail. With local storage, efficient rendering, and no network dependency, it offers real preparedness.

In future development stages, we envision users being able to share map packages directly between devices, using WiFi or Bluetooth. This would allow local dissemination of map data even when mobile networks or the internet are down – a crucial step toward true digital resilience and socially sustainable preparedness.

We hope initial contact leads to shared needs assessments, prioritization of functions, or joint project planning – in collaboration with institutions and public actors.

If interest is sufficient, we will propose an initial digital meeting to explore next steps together.

We welcome contact and dialogue:

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