Spatial analysis as a cost modeling tool for achievening full VHCN connectivity

Case study example:

Distance estimation and cost simulation for efficient high-capacity broadband deployment in Slovenia

Budva, September 29/30

Agenda

- **Basic Information**
  AKOS jurisdiction and legal framework

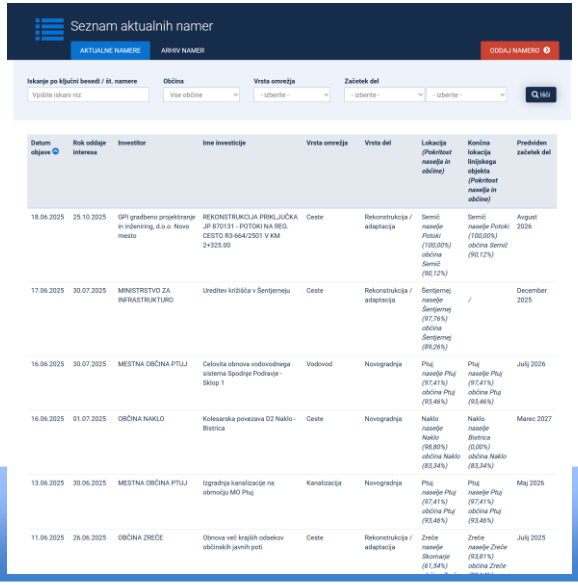
- **Starting Points**
  Identifying underserved areas, demand mapping, public policy goals and funding considerations.

- **STUDY CASE - Geographical Simulation**
  Use of spatial data to estimate distances, optimize routes, and select suitable technologies (underground, aerial, hybrid).

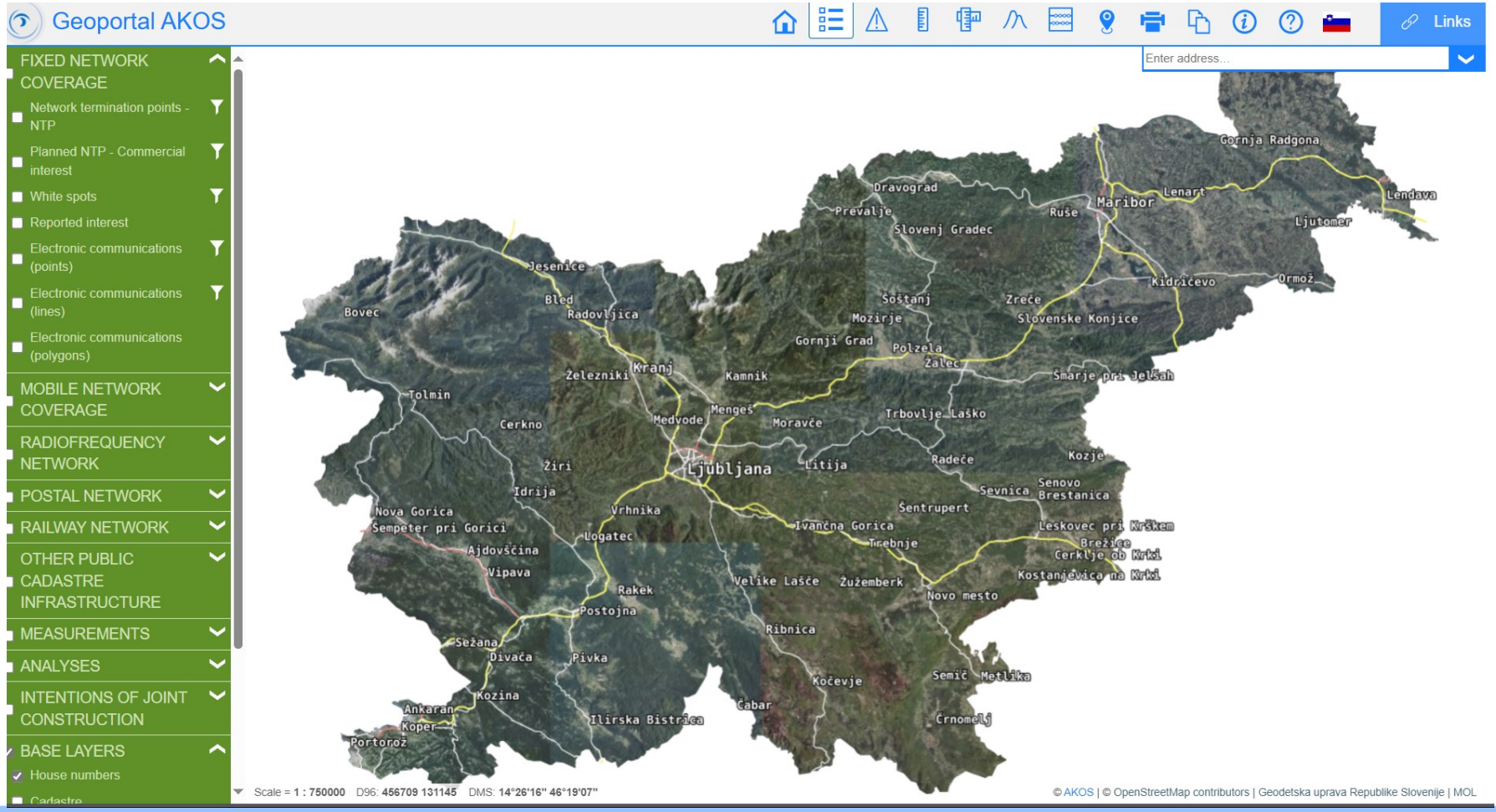
- **STUDY CASE - Cost Analysis**
  Simulation of investment needs under various rollout scenarios, including per-household estimates and coverage ratios.

Facilitating Joint Construction and Infrastructure Sharing

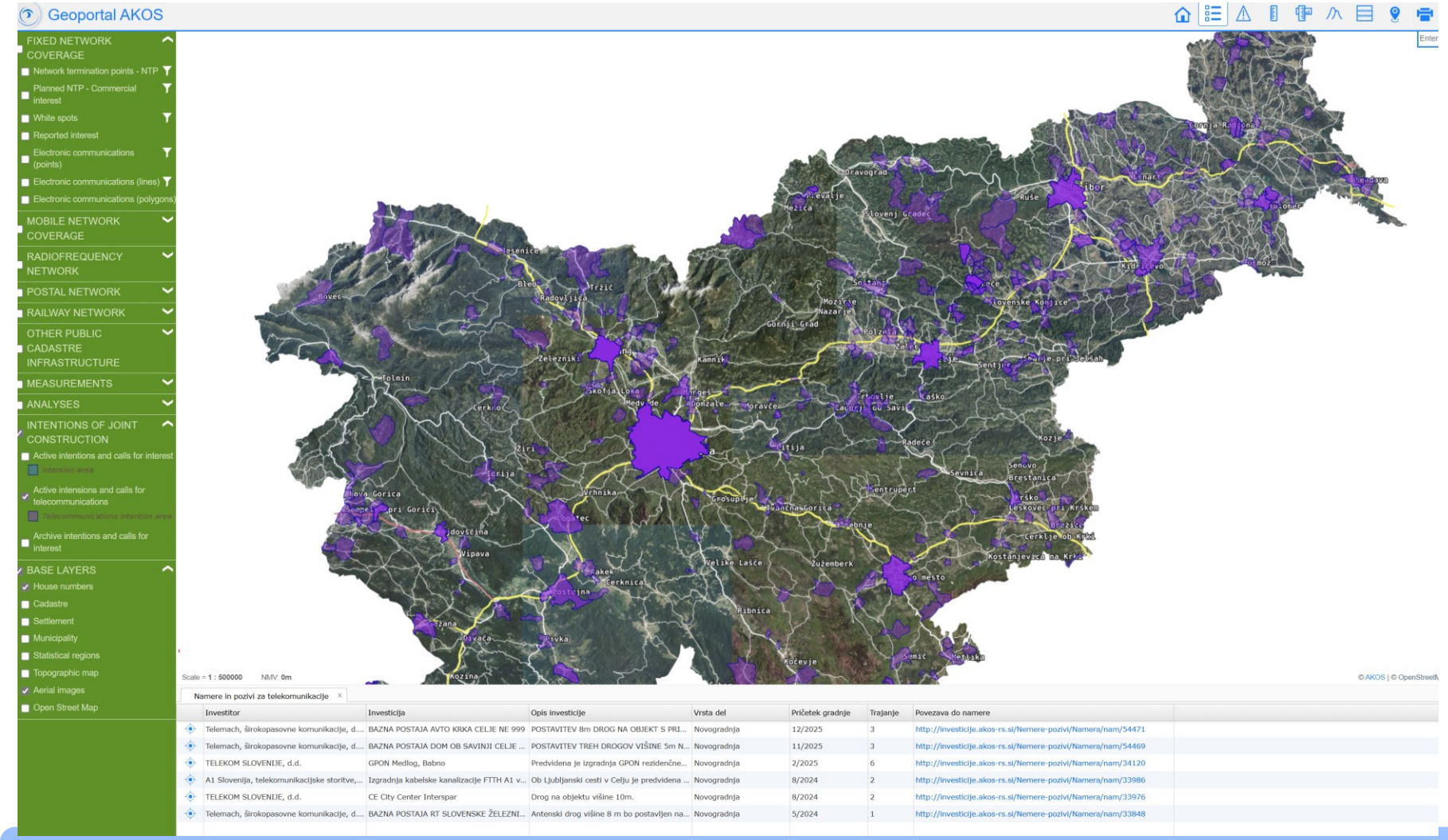
- One of the key measures to reduce the cost of deploying electronic communications networks is **joint construction** where interest is expressed.
- Infrastructure investors must notify the national regulatory authority of planned works and issue a **call for interest** to telecom operators. Notifications are published automatically via a web form. Interested parties must respond within a **minimum of 10 working days**.
- Telecom operators are required to submit **data on network locations, routes, and connection points** directly to the geodetic authority.
- Access to physical infrastructure must be offered under **fair and reasonable terms**. Refusals are only permitted under conditions set out in **Article 139 of the Electronic Communications Act (ZEKom-2)**. In case of disputes, the agency acts as a **dispute resolution body** upon request.



GEOPORTAL AKOS



Geographic display of infrastructure plans and expressions of interest



Investitor	Investicija	Opis investicije	Vrsta del	Pričetek gradnje	Trajanje	Povezava do namere
Telemach, širokopasovne komunikacije, d....	BAZNA POSTAJA AVTO KRKA CELJE NE 999	POSTAVITEV 8m DROG NA OBJEKT S PRI...	Novogradnja	12/2025	3	http://investicije.akos-rs.si/Nemere-pozivi/Namera/nam/54471
Telemach, širokopasovne komunikacije, d....	BAZNA POSTAJA DOM OB SAVINJI CELJE ...	POSTAVITEV TREH DROGOV VIŠINE 5m N...	Novogradnja	11/2025	3	http://investicije.akos-rs.si/Nemere-pozivi/Namera/nam/54469
TELEKOM SLOVENIJE, d.d.	GPON Medlog, Babno	Predvidena je izgradnja GPON rezidenčne...	Novogradnja	2/2025	6	http://investicije.akos-rs.si/Nemere-pozivi/Namera/nam/34120
A1 Slovenija, telekomunikacijske storitve,...	Izgradnja kabelske kanalizacije FTTH A1 v...	Ob ljubljanski cesti v Celju je predvidena ...	Novogradnja	8/2024	2	http://investicije.akos-rs.si/Nemere-pozivi/Namera/nam/33986
TELEKOM SLOVENIJE, d.d.	CE City Center Interspar	Drog na objektu višine 10m.	Novogradnja	8/2024	2	http://investicije.akos-rs.si/Nemere-pozivi/Namera/nam/33976
Telemach, širokopasovne komunikacije, d....	BAZNA POSTAJA RT SLOVENSKE ŽELEZNI...	Antenski drog višine 8 m bo postavljen na...	Novogradnja	5/2024	1	http://investicije.akos-rs.si/Nemere-pozivi/Namera/nam/33848

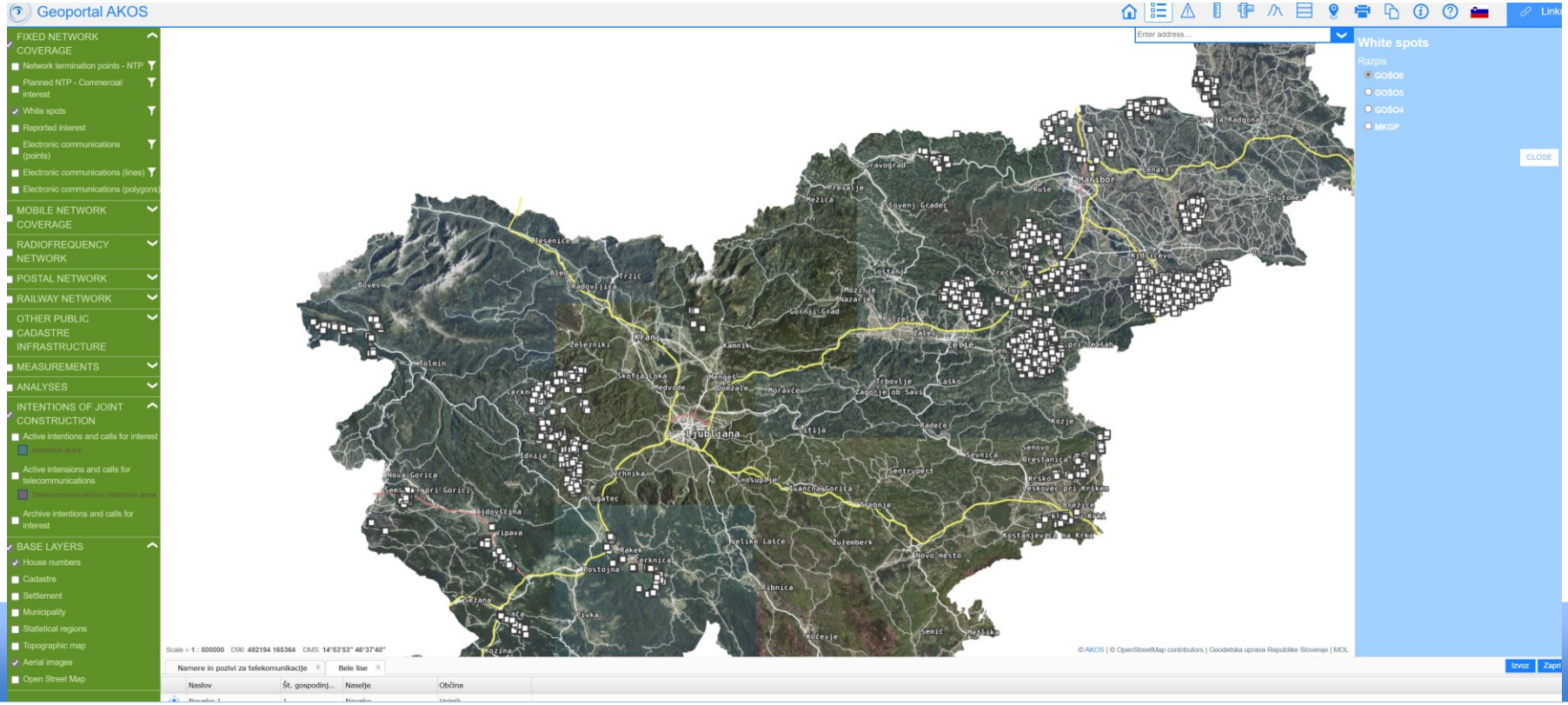
Market Interest Inquiry & Use of Public Funds (ZEKom-2)

- A public authority intending to grant **state aid for VHCN deployment** (≥100 Mbit/s) must **request AKOS to launch a market interest inquiry** for the relevant area.
- The request must include key data: area, project timeline (≤3 years), type of network/infrastructure, capacity, and co-funding structure.
- AKOS collects expressions of interest from telecom operators; if overlapping interests are identified, parties are encouraged to **coordinate** and avoid duplicating infrastructure.
- If agreement is reached, updated investment plans must be submitted within 15 days. If not, AKOS informs the granting authority.
- AKOS publishes results and **responds within 6 months** of the request.
- Public funds can only be used if **no market interest** is shown and in line with **EU state aid rules (Art. 107 & 108 TFEU)**.
- The government sets detailed conditions by **regulation** (eligible costs, co-funding process, pricing of access, monitoring and clawback mechanisms).

State Aid for High-Capacity Broadband Rollout in White Areas

The funding scheme supports the construction or upgrade of fixed very high-capacity broadband networks in white areas – regions with limited access to fast internet.

The goal is to provide at least 300 Mbit/s download and 100 Mbit/s upload to households in these areas. Special focus is placed on sparsely populated areas (<150 inhabitants/km²) and geographically challenging regions across Slovenia.



Study case -Starting point

Objective:

To develop a model for estimating the cost of gigabit infrastructure deployment in Slovenia

- Assessment of individual deployment scenarios
- Identification of the optimal scenario

Scope of analysis

- approx 80k network termination points without fiber, coaxial access, GOŠO6 coverage, or expressed market interest
- Distance is calculated based on the shortest road combination leading to the nearest existing manhole or fiber route intersection (new manhole if needed)

Route length to be constructed

To buildings where:

- a person is officially registered (permanent or temporary residence), or
- the registered seat of a business entity is located

Estimated construction costs

- €25,000/km for standard construction
- €40,000/km when easements are required (papers)
- €10,000/km when using low-voltage electricity poles

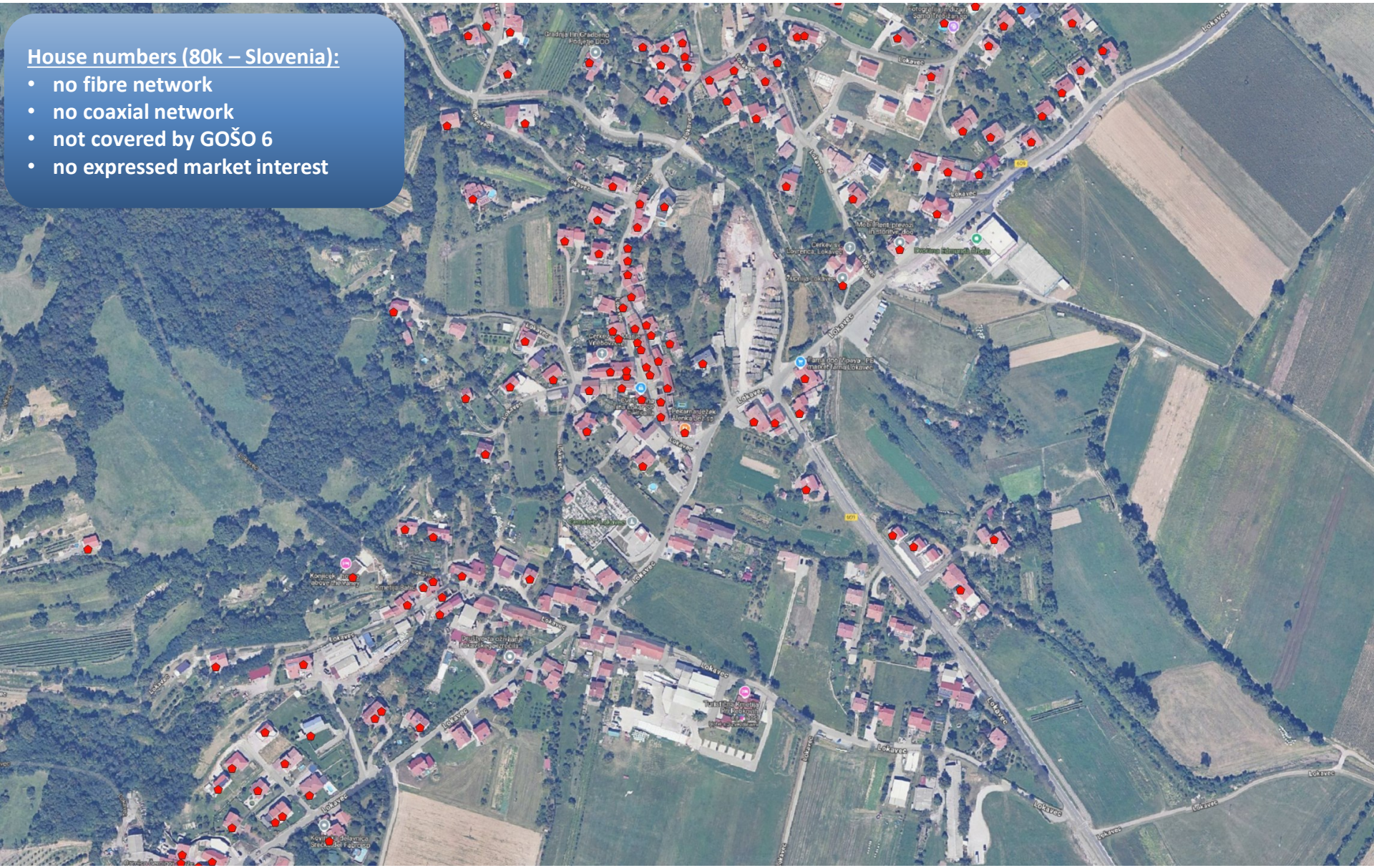
Commercial deployment cost

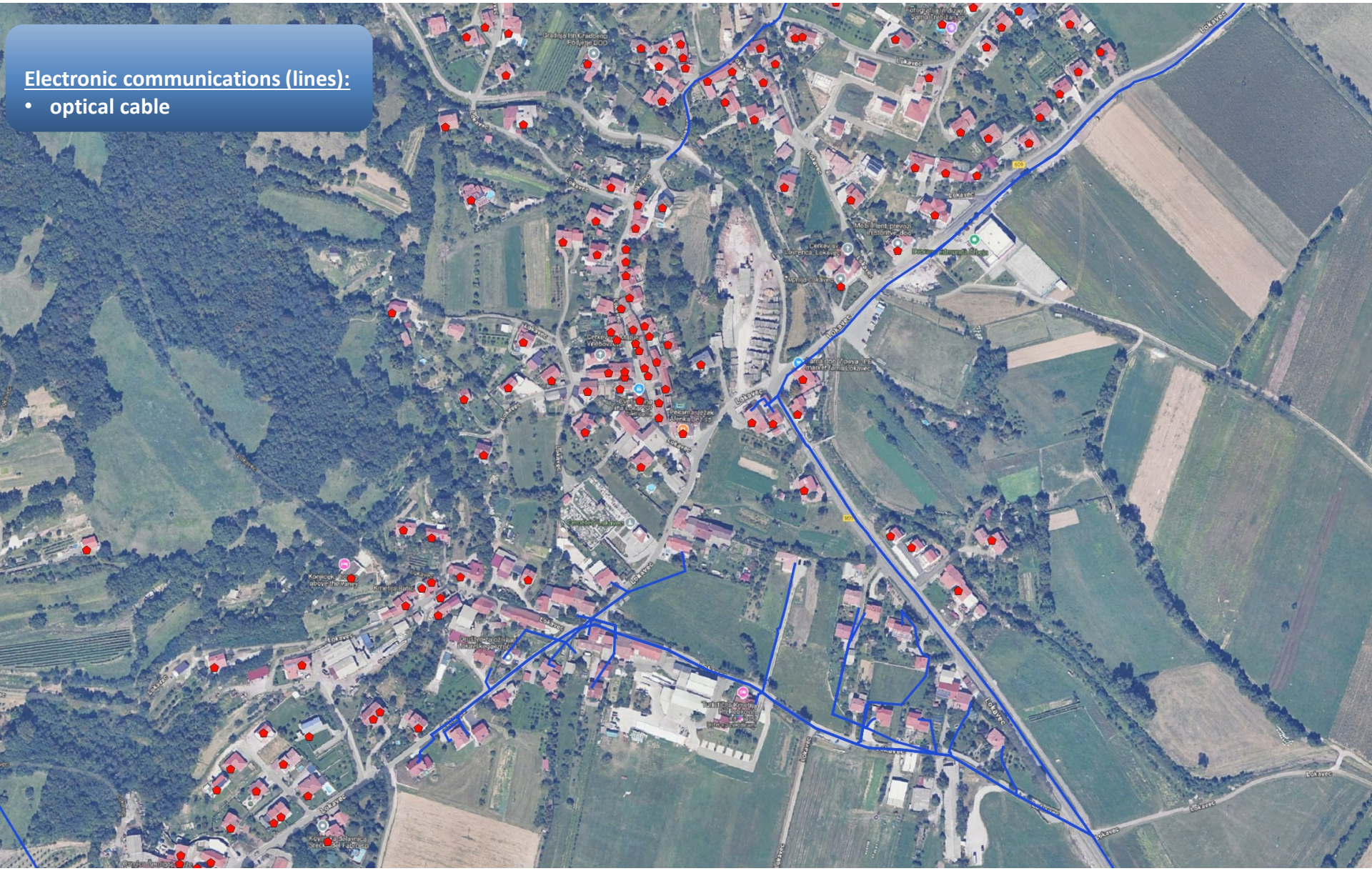
- €2,000 - €4,000 per connection

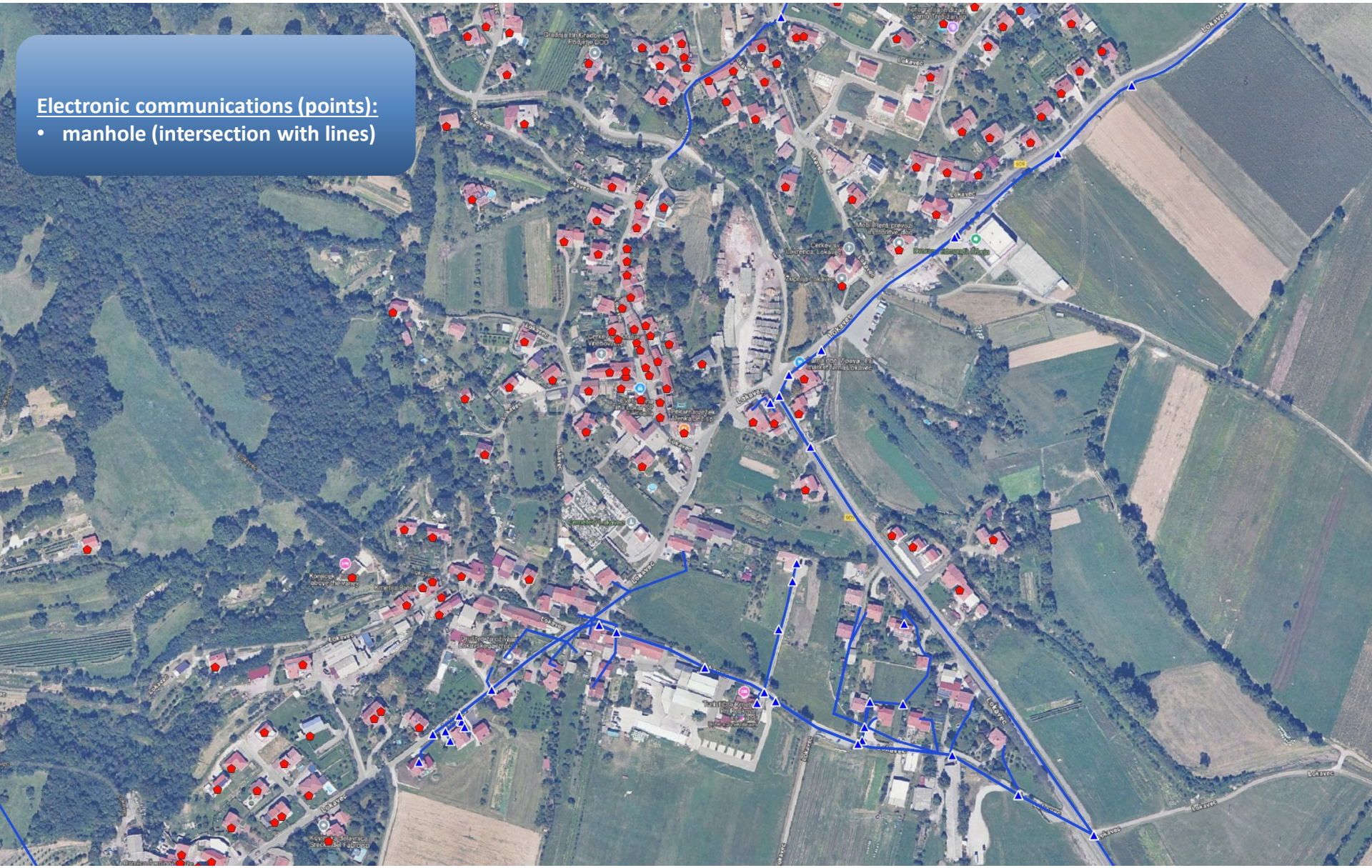
Data sources – publicly available databases

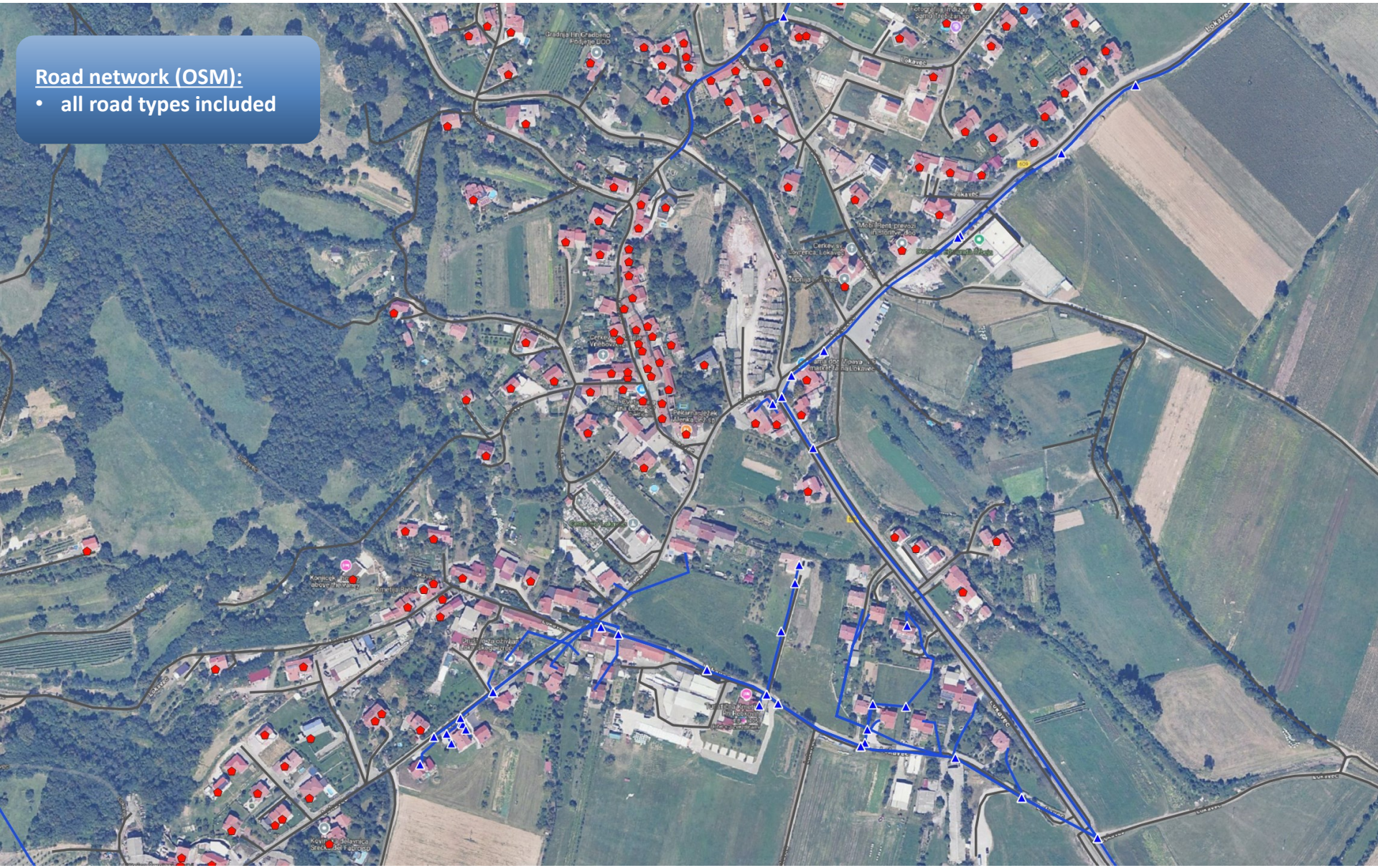
SOURCE	DATASET	ACCESS METHOD	VALIDITY
Surveying and Mapping Authority of the Republic of Slovenia (GURS)	ZK GJI (lines and manholes)	Web service	12/2024
Surveying and Mapping Authority of the Republic of Slovenia (GURS)	HS (house numbers)	Web service	12/2024
Surveying and Mapping Authority of the Republic of Slovenia (GURS)	OPT (network connection points)	Web service	12/2024
Ministry of the Interior (MNZ)	CRP (permanently and temporarily occupied dwellings)	SOVD	12/2024
AJPES	PS (business entities)	Web	12/2024
OpenStreetMap Foundation	OpenStreetMap (OSM)	Web	12/2024

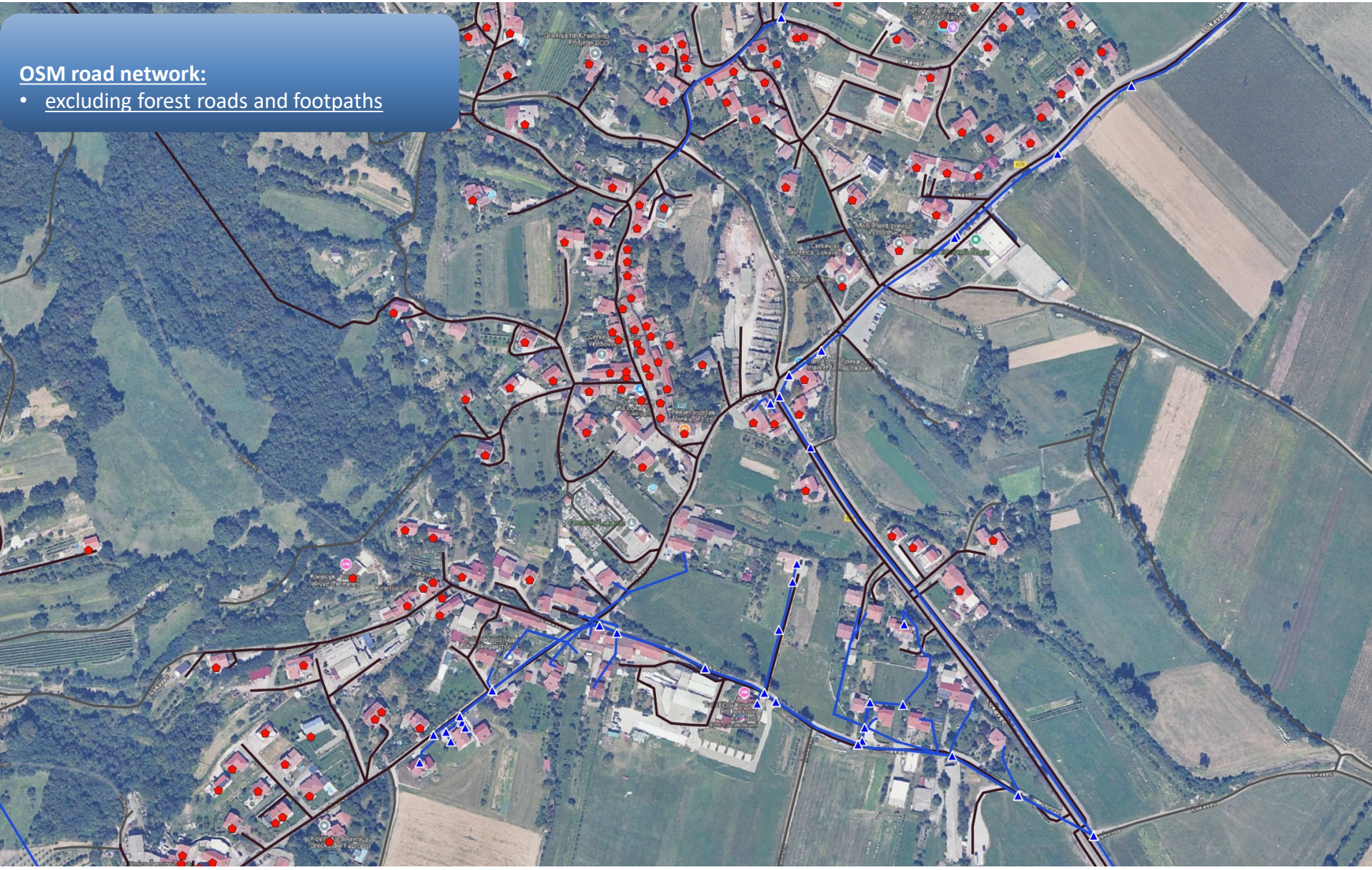
Study case: settlemet Lokavec

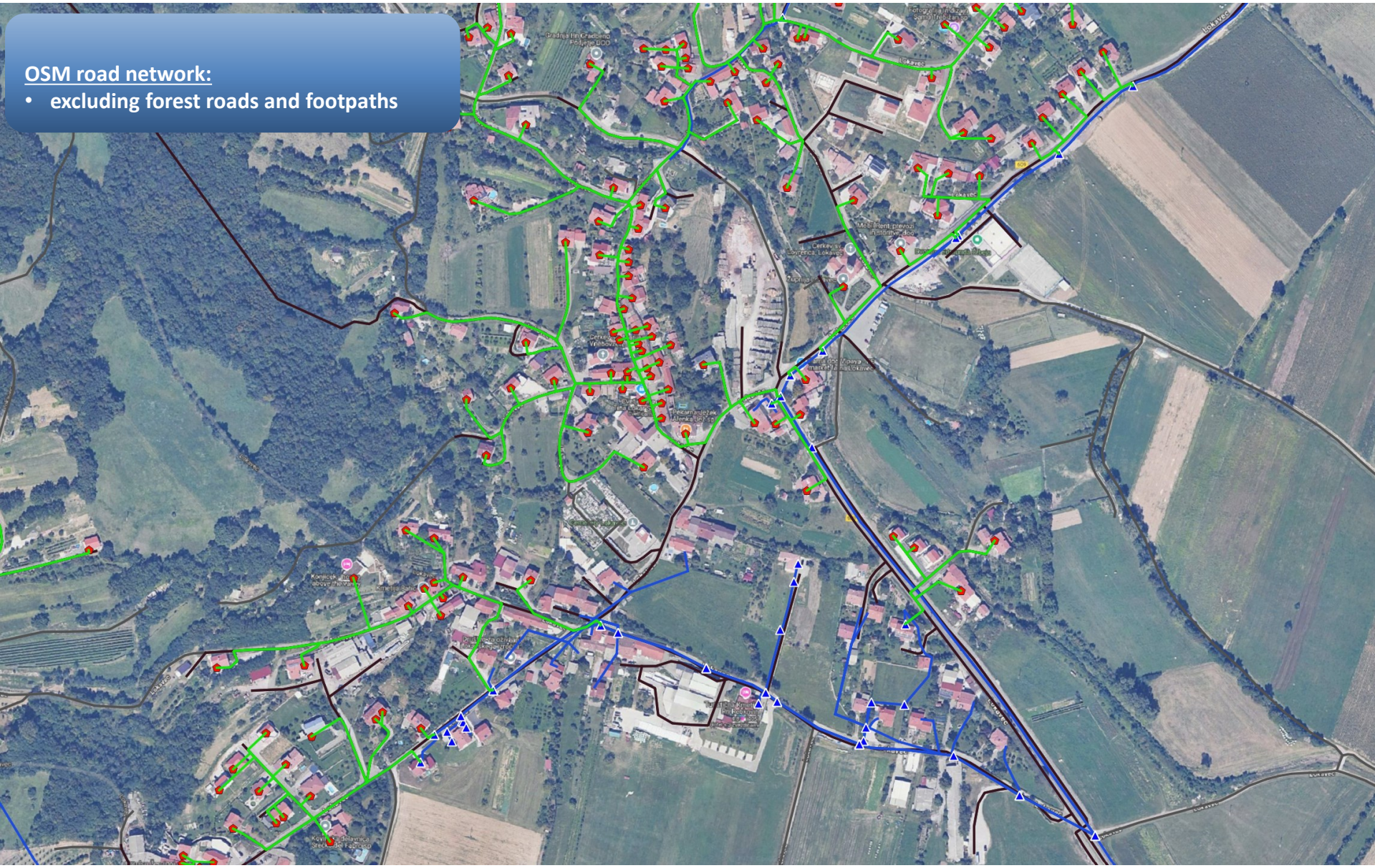

House numbers (80k – Slovenia):
• no fibre network
• no coaxial network
• not covered by GOŠO 6
• no expressed market interest


Electronic communications (lines):
• optical cable


Electronic communications (points):
• manhole (intersection with lines)


Road network (OSM):
• all road types included


OSM road network:
- excluding forest roads and footpaths


OSM road network:
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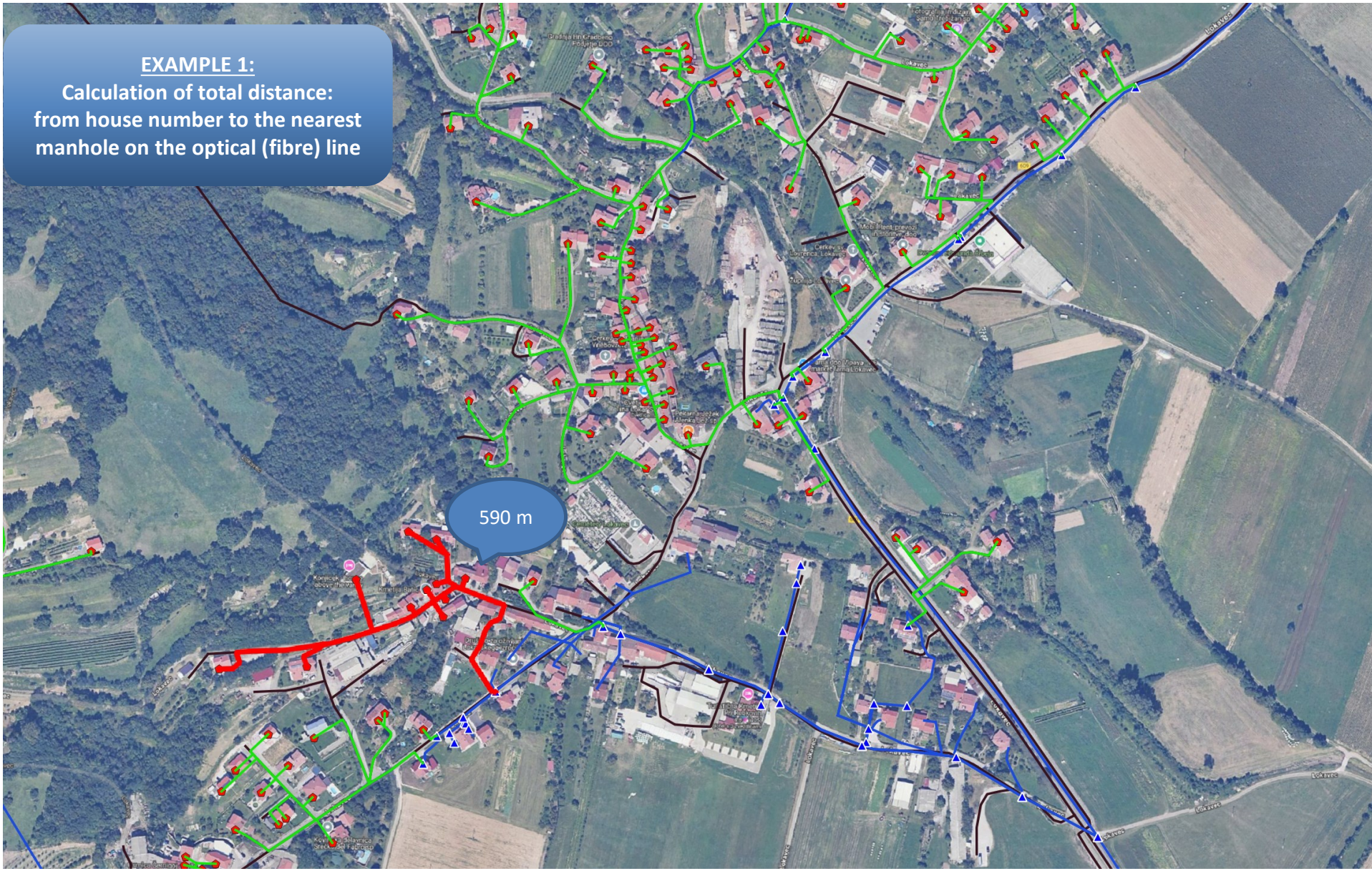
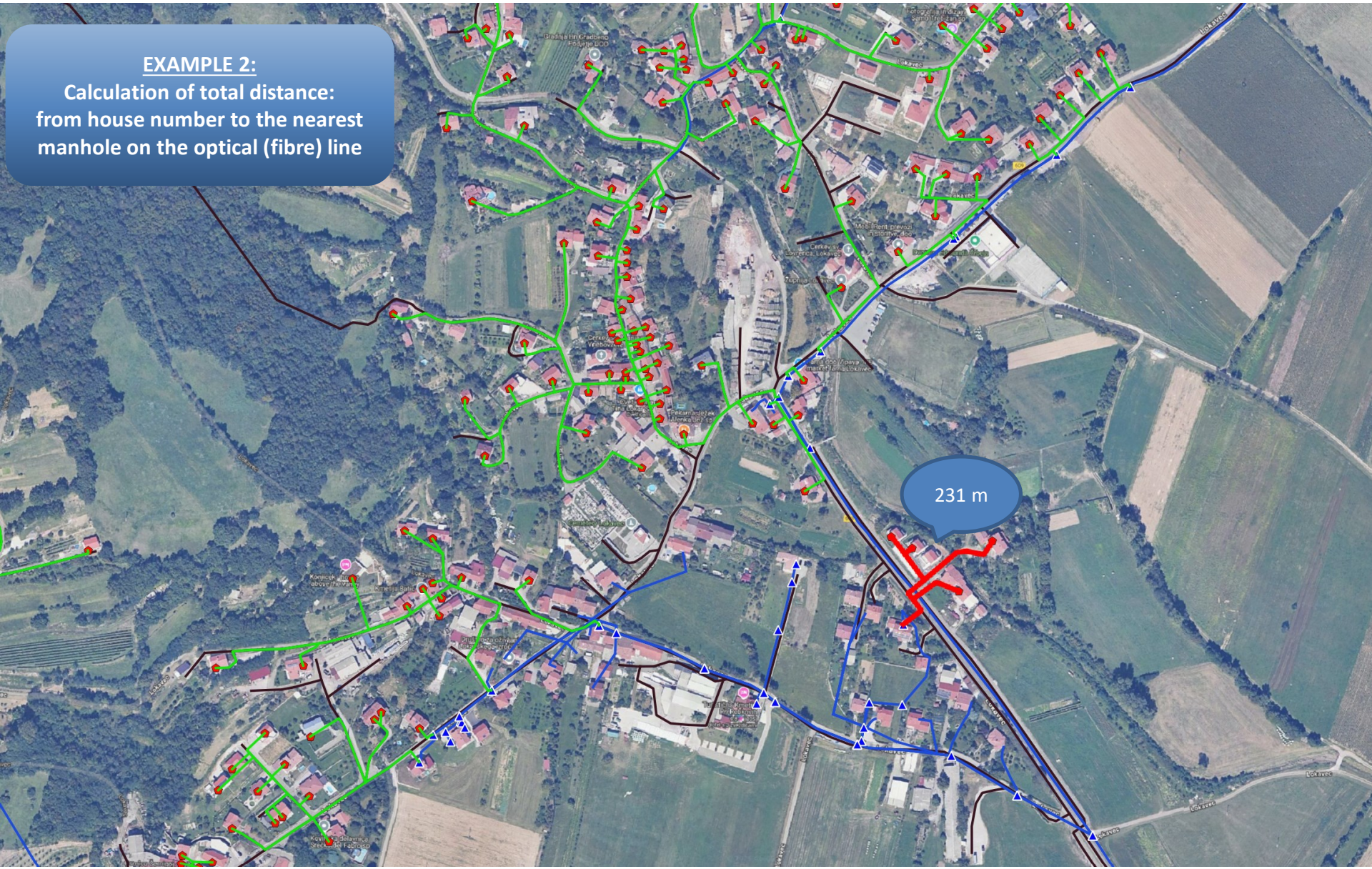
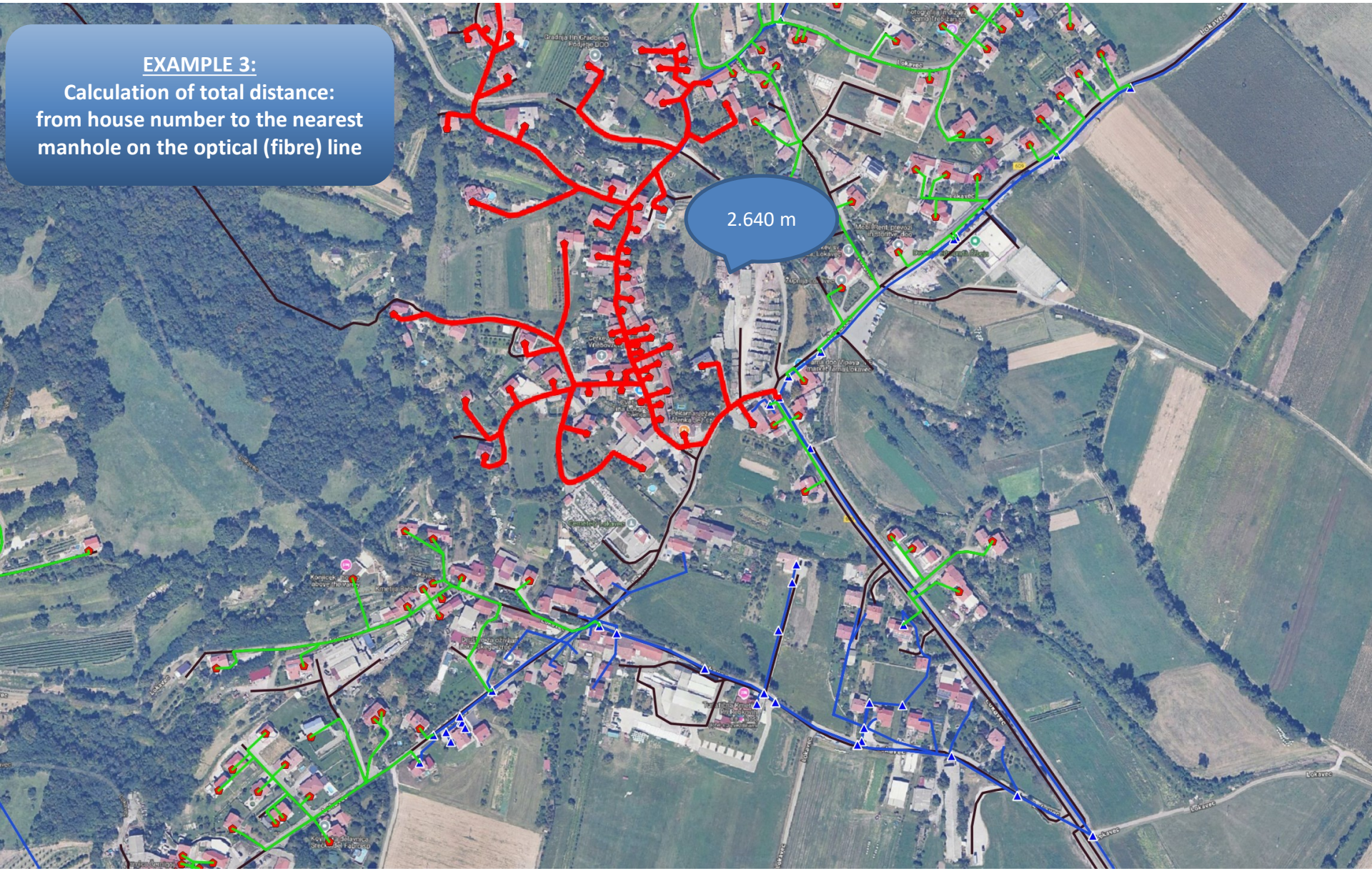
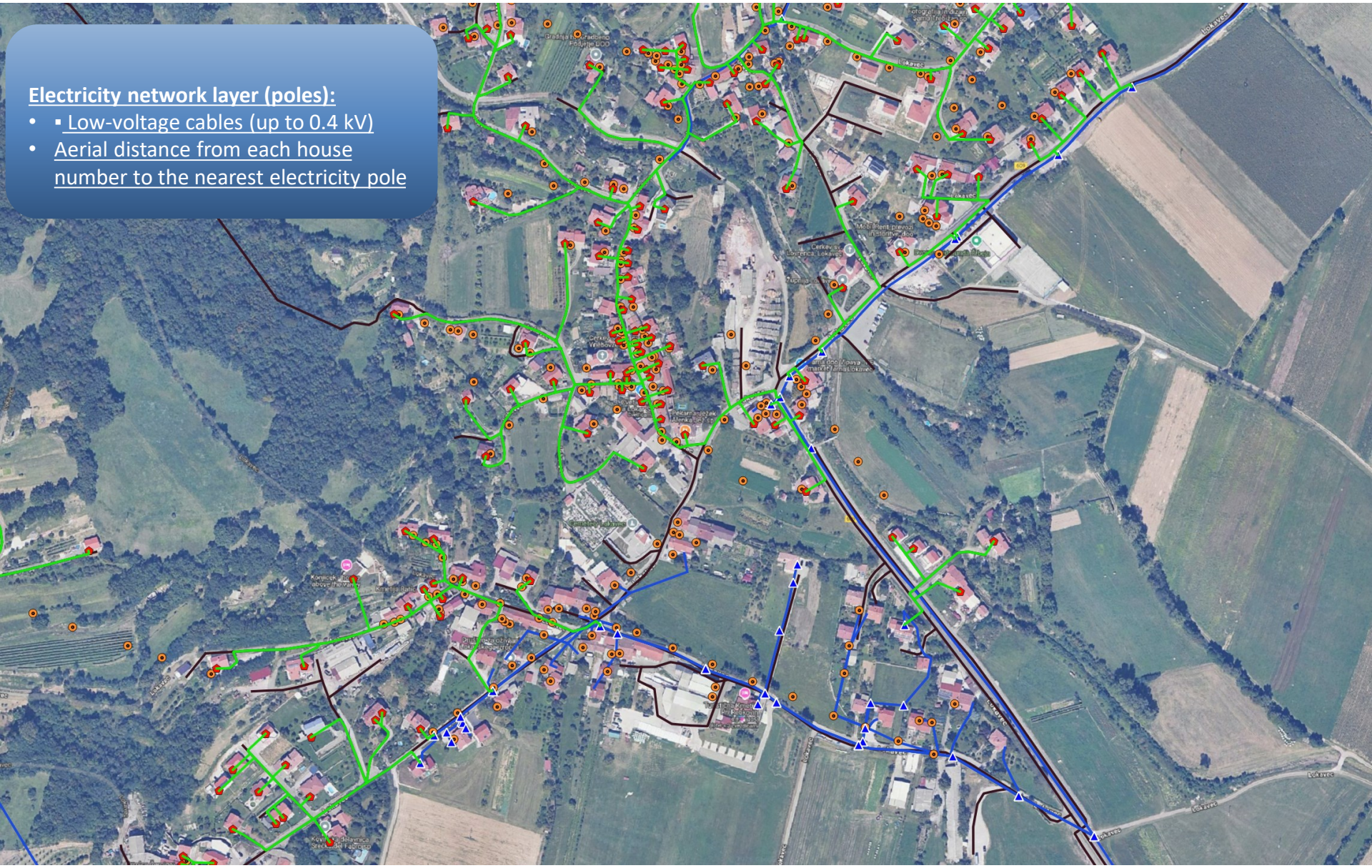

EXAMPLE 1:
Calculation of total distance:
from house number to the nearest
manhole on the optical (fibre) line
590 m

EXAMPLE 2:

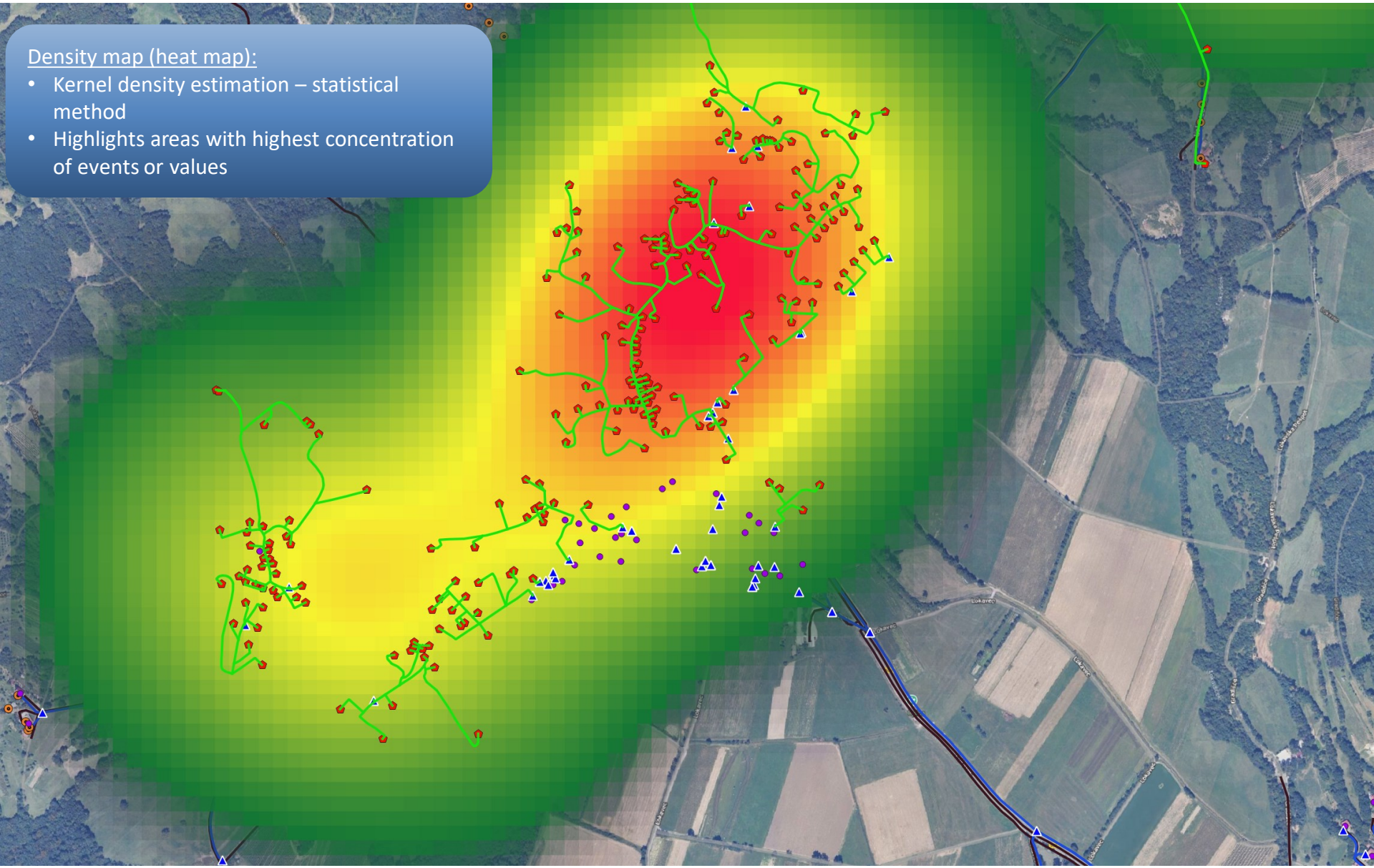
Calculation of total distance: from house number to the nearest manhole on the optical (fibre) line

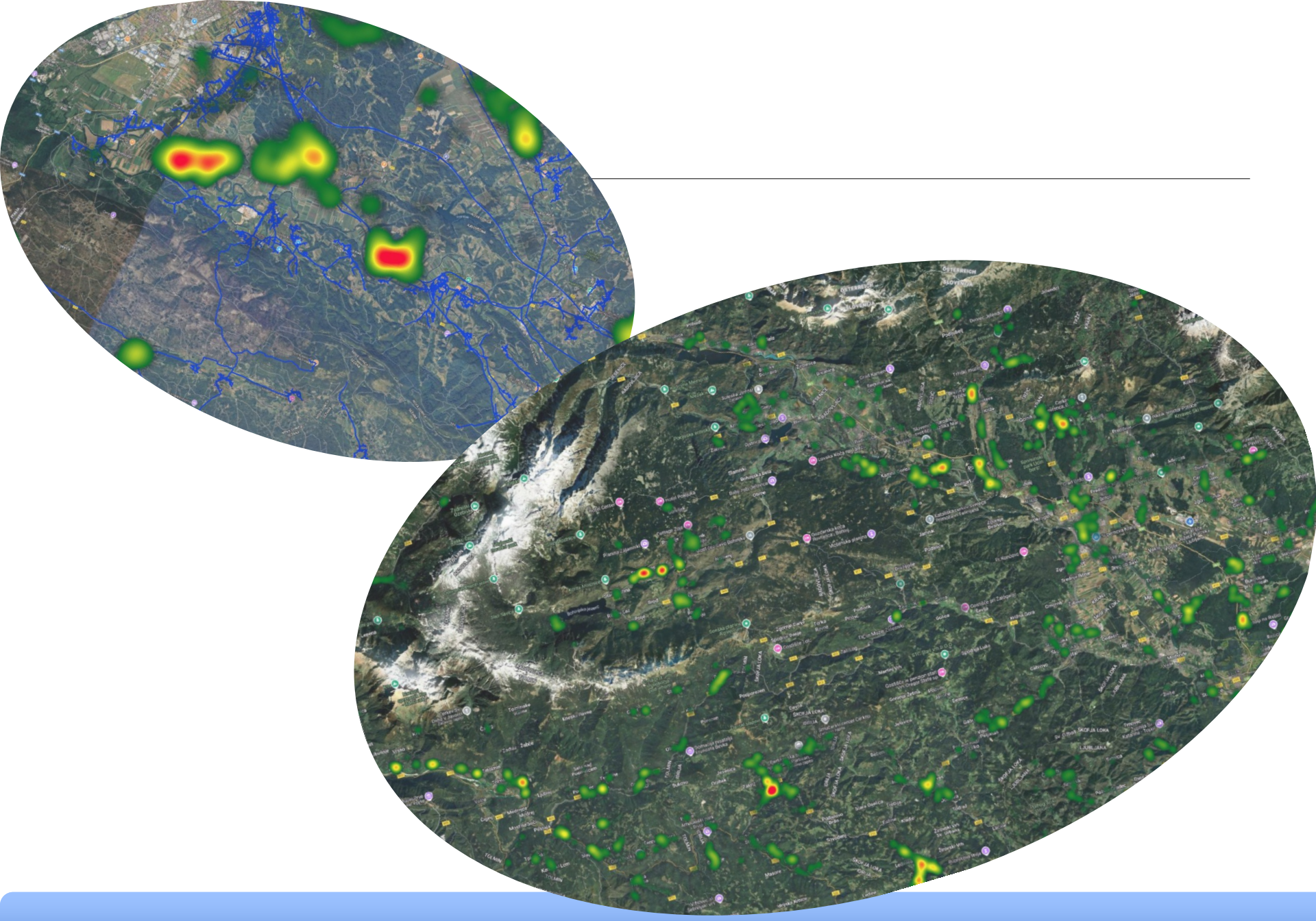



EXAMPLE 3:
Calculation of total distance:
from house number to the nearest
manhole on the optical (fibre) line
2.640 m

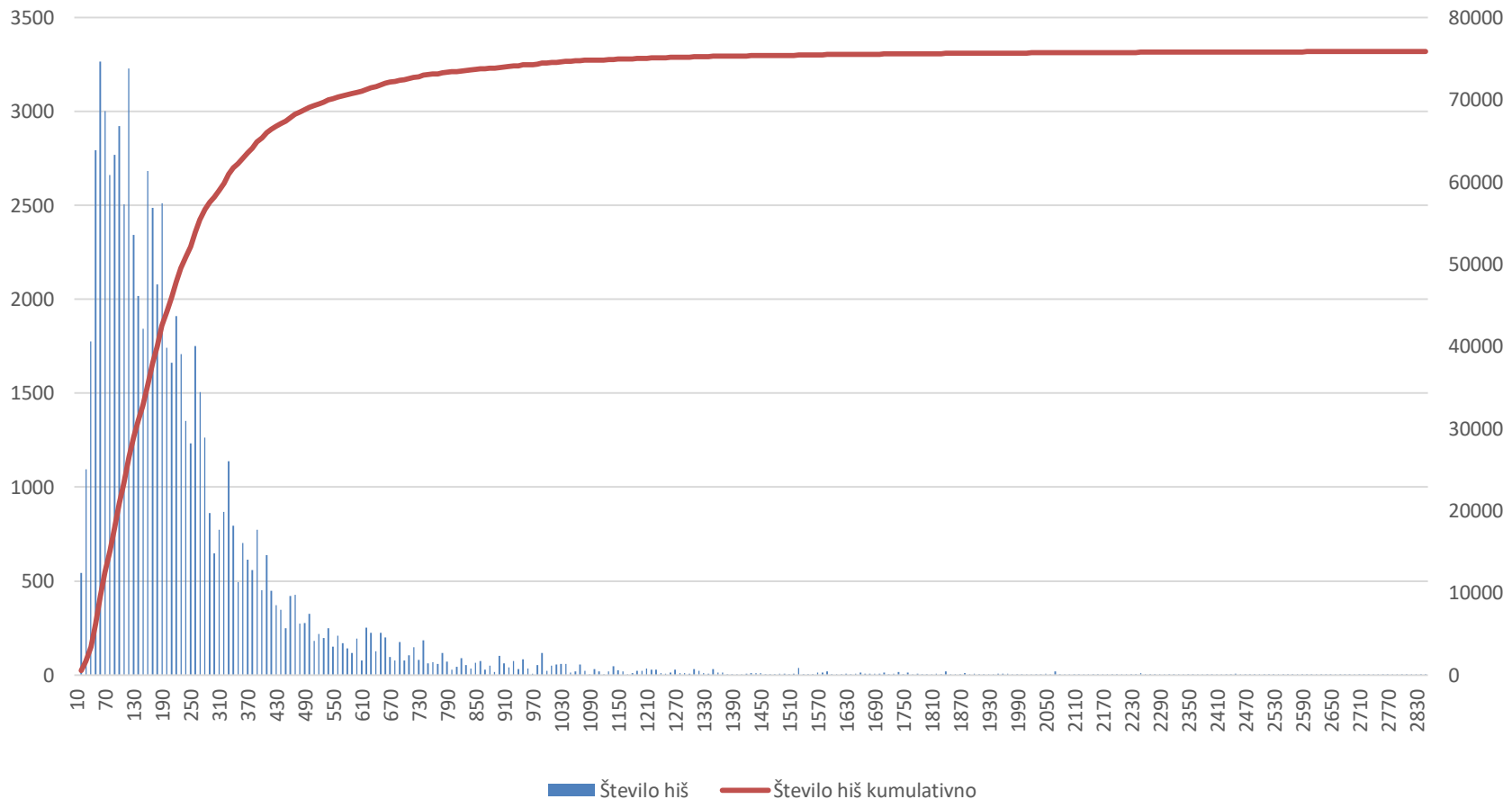

Electricity network layer (poles):
▪ Low-voltage cables (up to 0.4 kV)
Aerial distance from each house number to the nearest electricity pole


Coverage layer for mobile operators (covering 75% of households):
- minimum of two mobile operators available
- minimum speed of 30 Mbit/s (Universal Service Obligation)

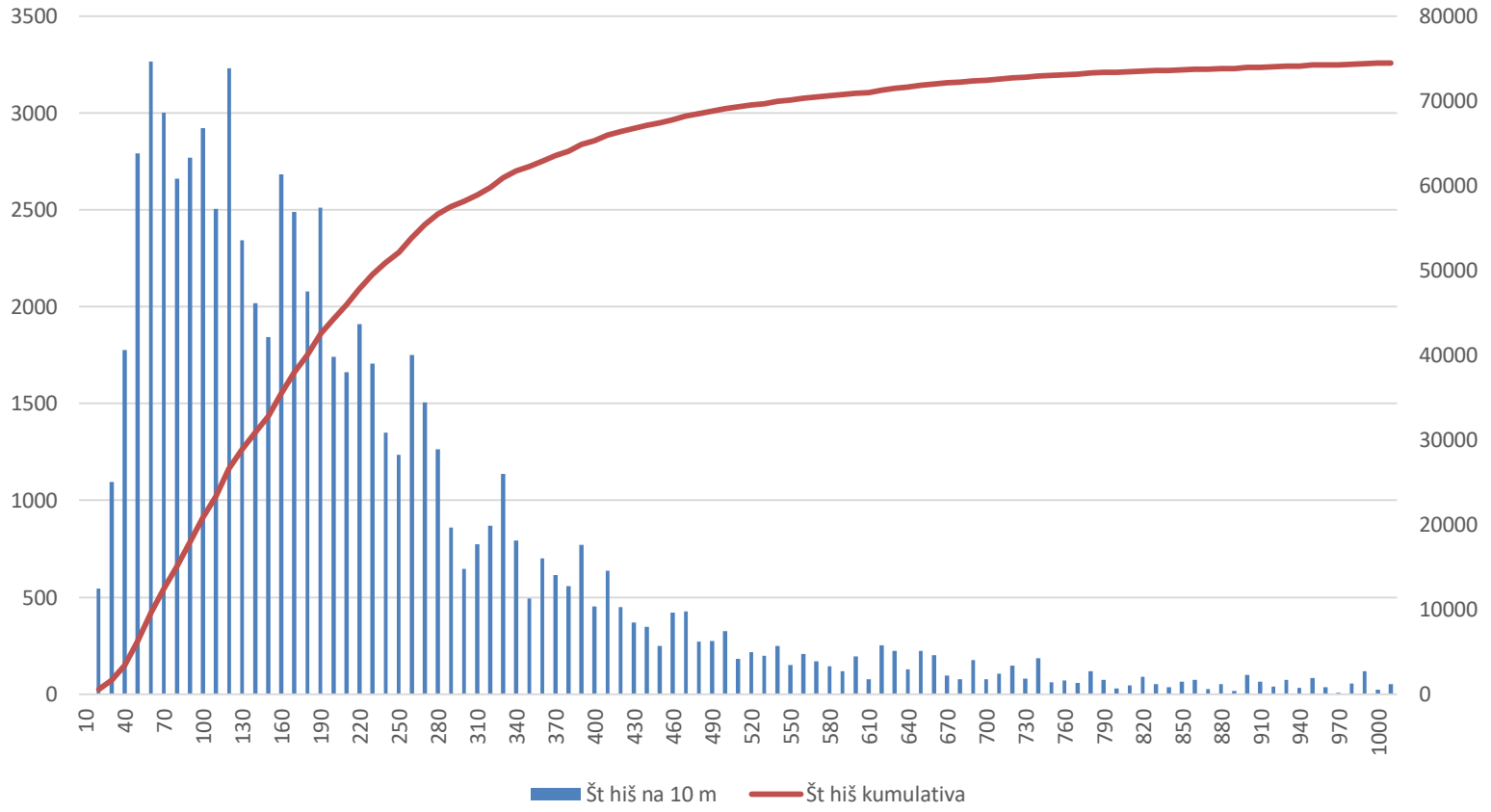

Density map (heat map):
• Kernel density estimation – statistical method
• Highlights areas with highest concentration of events or values



Distance distribution of households

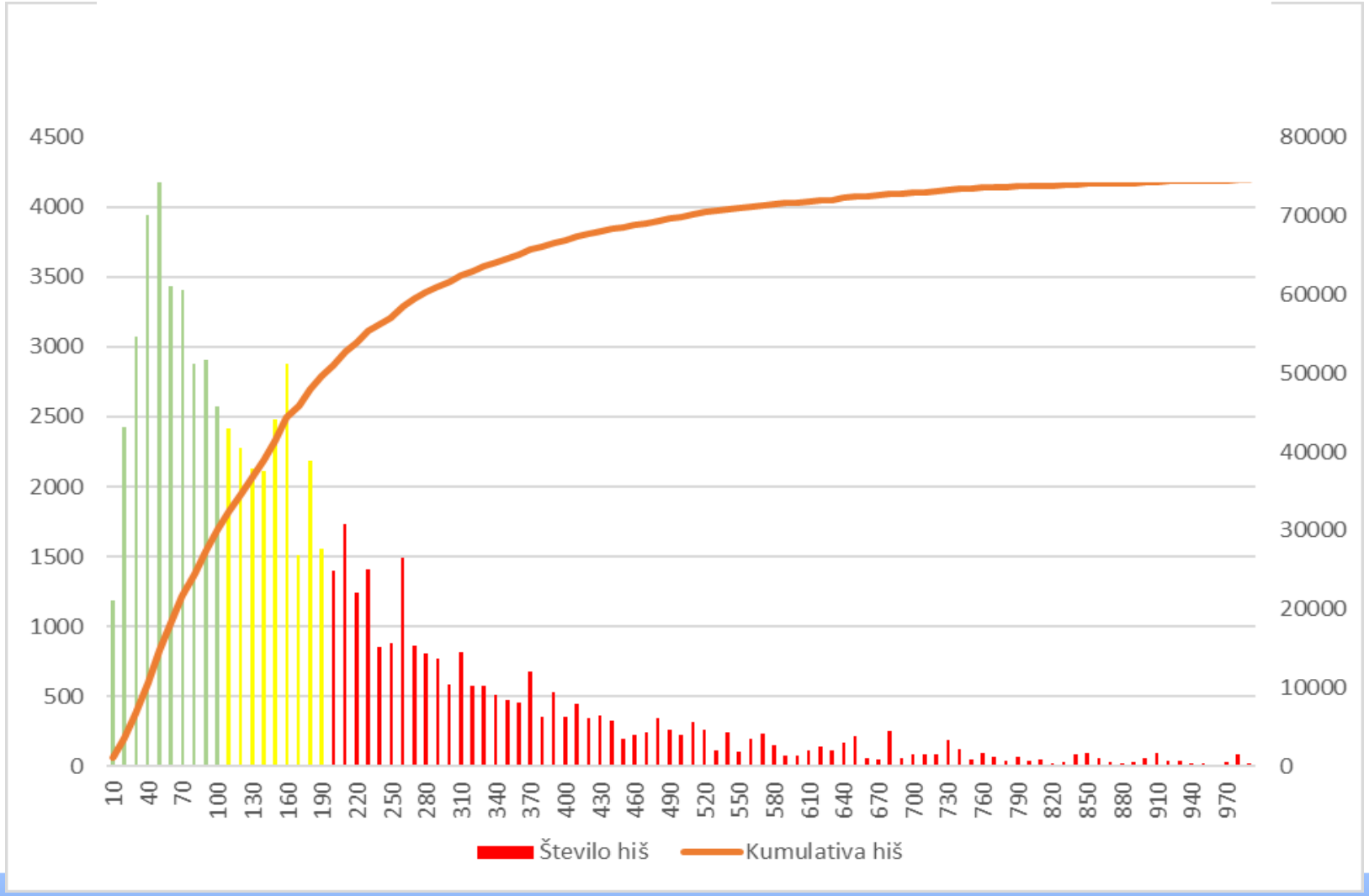


Distance distribution of households, up to 1km

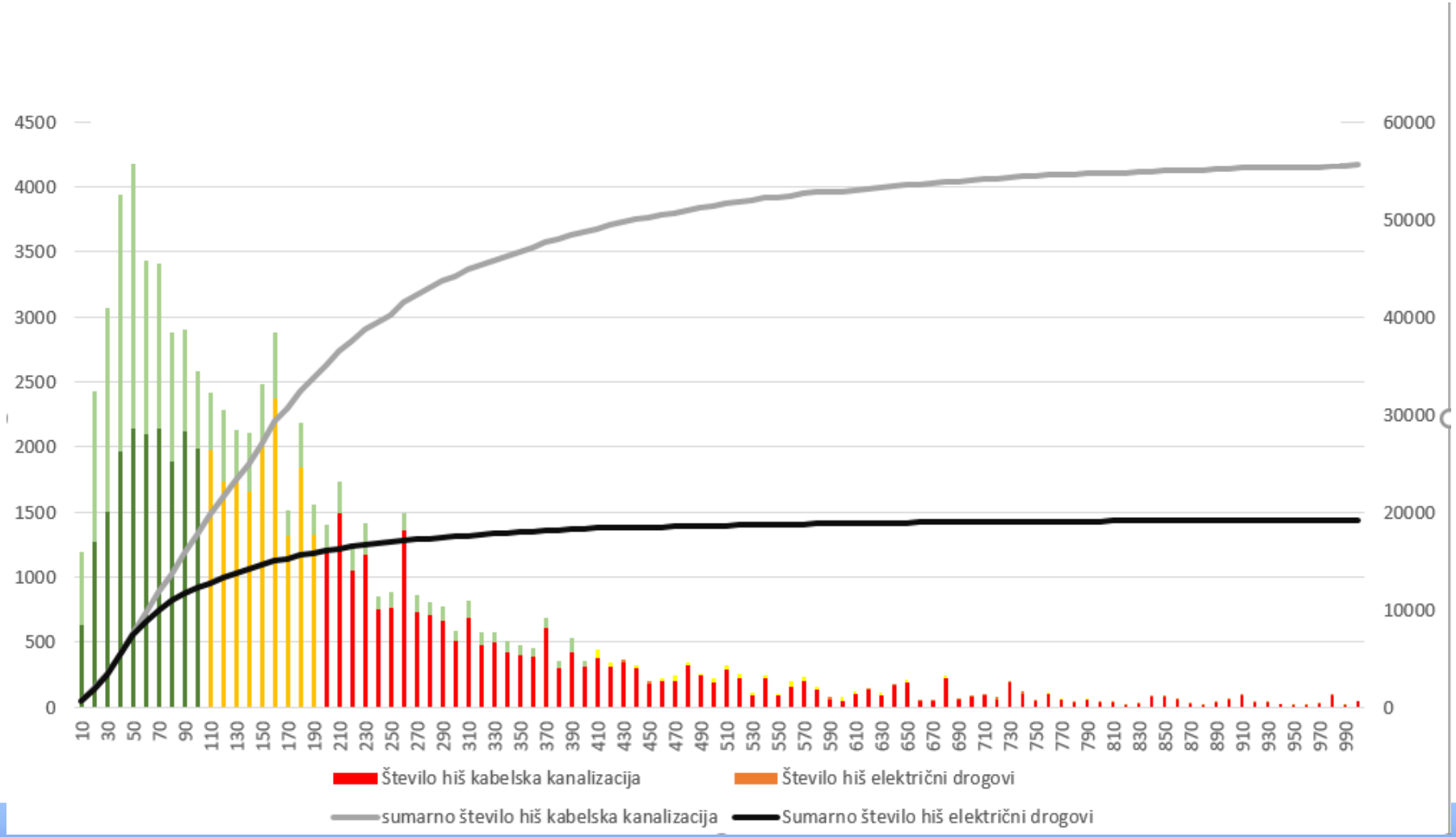


A total of 1,5k houses are located more than 1,000 metres away (from a total of 80k)

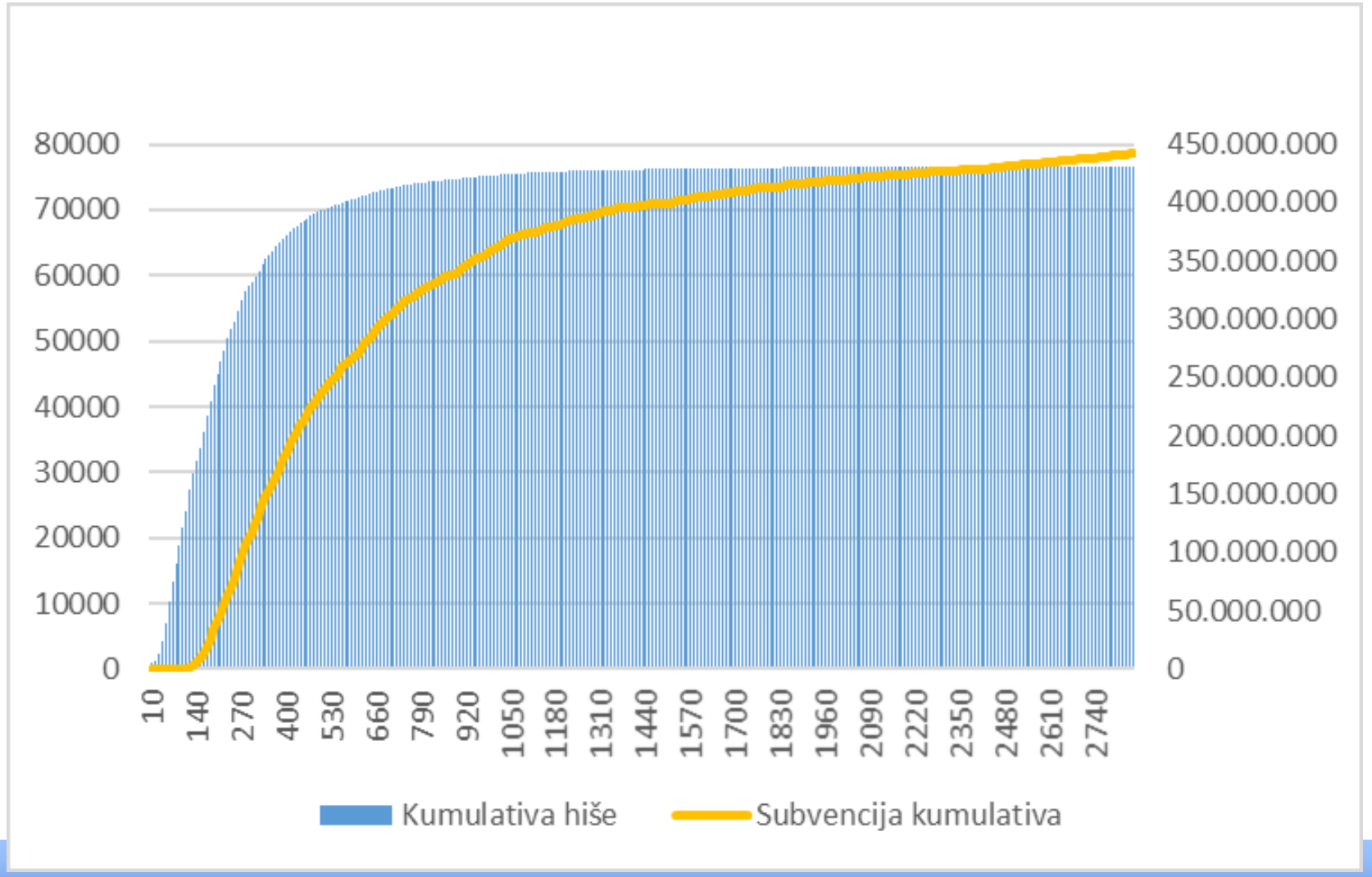
Number of covered houses, cost 40,000 EUR/km, maximum subsidy 3,500 EUR, additional manholes built along the routes



Number of covered houses, ducting and utility poles, cost 40,000 EUR/km for ducting, cost for poles 10,000 EUR/km, maximum subsidy 3,500 EUR



Amount of subsidies vs. number of covered houses
Cost: 40,000 EUR/km – update needed for scenario with new manholes and scenario with poles



Summary and Current Status

Investment Model Proposal for Public Funding

We have prepared a proposal for the Ministry outlining a model to calculate optimal broadband infrastructure investments and support the efficient allocation of public funds.

The model was presented to the Government, received positive feedback, and was approved for further implementation.

A joint working group between AKOS and the Ministry has been established and is already operating.

The group aims to prepare a draft public call by the end of the year.

The goal is to allocate funds as efficiently as possible to ensure full coverage and meet the EU connectivity targets.

Thank you for your attention.

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