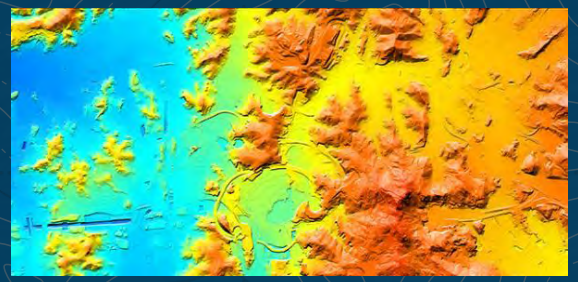
VISICOM®

2.5D AND 3D DIGITAL MAPS

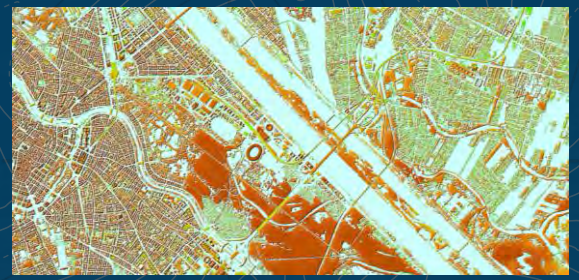
FOR RAILWAYS



INITIAL PLANNING AND MACRO ANALYSIS

LARGE-SCALE COVERAGE ESTIMATIONS

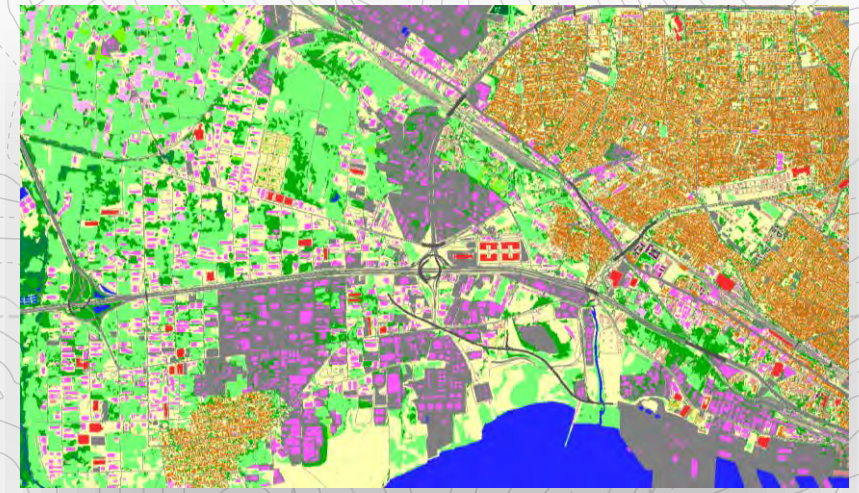
LONG-TERM INFRASTRUCTURE PLANNING



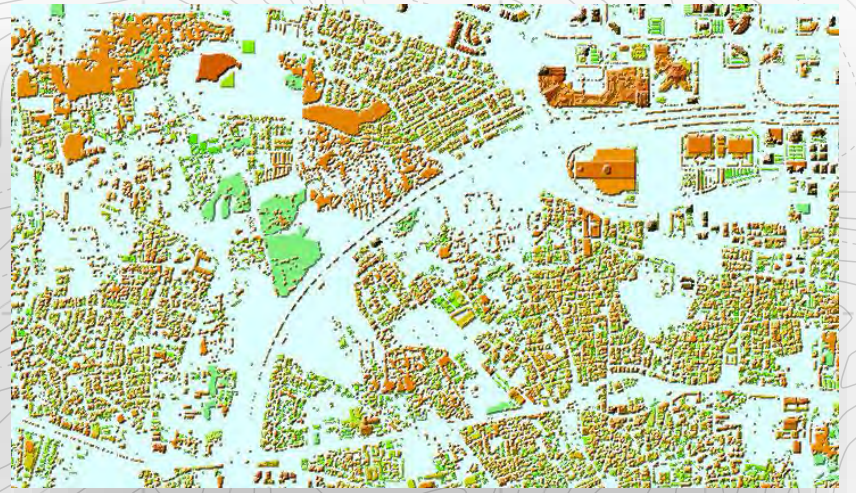
COST SAVING

ROLE OF 2.5D AND 3D MAPS TO SIMPLIFY ACCURATE 5G PLANNING

2.5D MODELS



3D MODELS



KEY BENEFITS

- Delivery in any RF/GIS tools formats
- Compatibility with any propagation model
- Support any raytracing models
- Fitted to requirements of mmWave frequencies
- Contain the most up-to-date information

We understand the specific needs of each country in diverse regions and have data that precisely meets those needs

ADVANCED ACCURACY IS REQUIRED FOR 5G NETWORK PLANNING

5G radio-planning processes requires more detailed, accurate and up-to-date maps in comparison with previous networks generations

Because of the sensitivity of radio waves, it is necessary to have an adequate level of maps details, which tends to grow – 3D buildings with roofs features; 3D vegetation, which also can affect the signal propagation, with crown and trunk features

1M or 2M RESOLUTION 3D MAPS

- **3D Buildings** include small roof details
- **3D Trees Model** with separate crowns
- **3D Bridges** displaying precise and detailed engineering constructions

2.5D 5M and 10M RESOLUTION MAPS

2.5D maps play an important role, in the early stages of network planning or for analyzing large areas.

- Large-Scale Coverage Estimations
- Faster Modeling
- Integration with existing Data
- Long-Term Infrastructure Planning

- Improved clutter classification
- **Clutter Heights for obstacles**
- Detailed street/road network

3D Mapping for Railways

3D DATA FOR 5G RAIL PLANNING

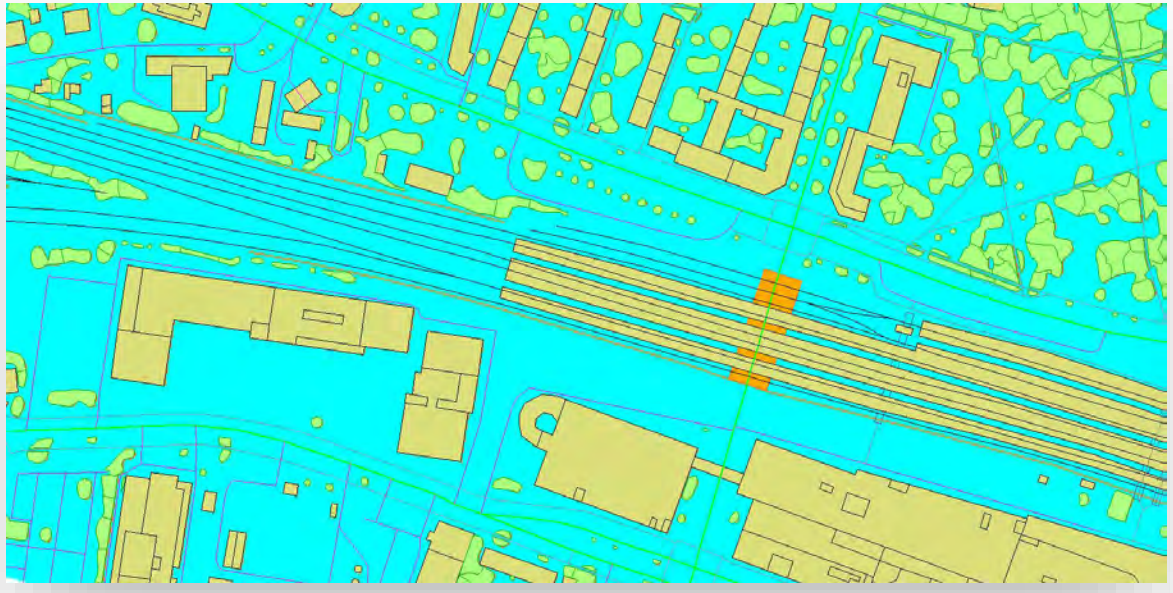
PRODUCTS FEATURES

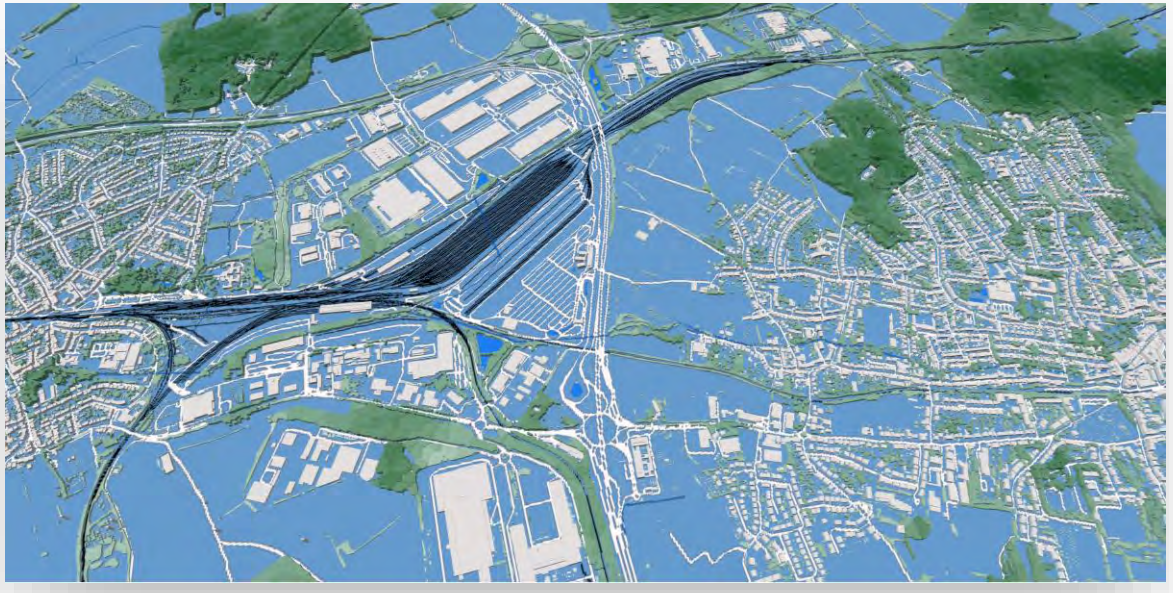
- 1m or 2m resolution 3D maps in buffer zone along the railway
- Buffer zone from 500 m to 1 km from each side of railway
- All terrain features are represented
- All artificial obstacles are included

- **Tunnels**
- **Bridges and overpasses**
- **Road and interchanges**
- **Buildings**
- **Trees**
- **Soundproof walls**

WHY IT MATTERS

Accurate 3D data is essential for optimizing 5G network deployment along railways, where signal interference and coverage gaps can impact connectivity. By incorporating all terrain features and artificial obstacles, our high-resolution maps help telecom operators ensure seamless network performance, even in challenging environments like tunnels, bridges, and densely built areas. This precise data supports efficient network planning, reduces deployment costs, and enhances connectivity for passengers and railway operations.





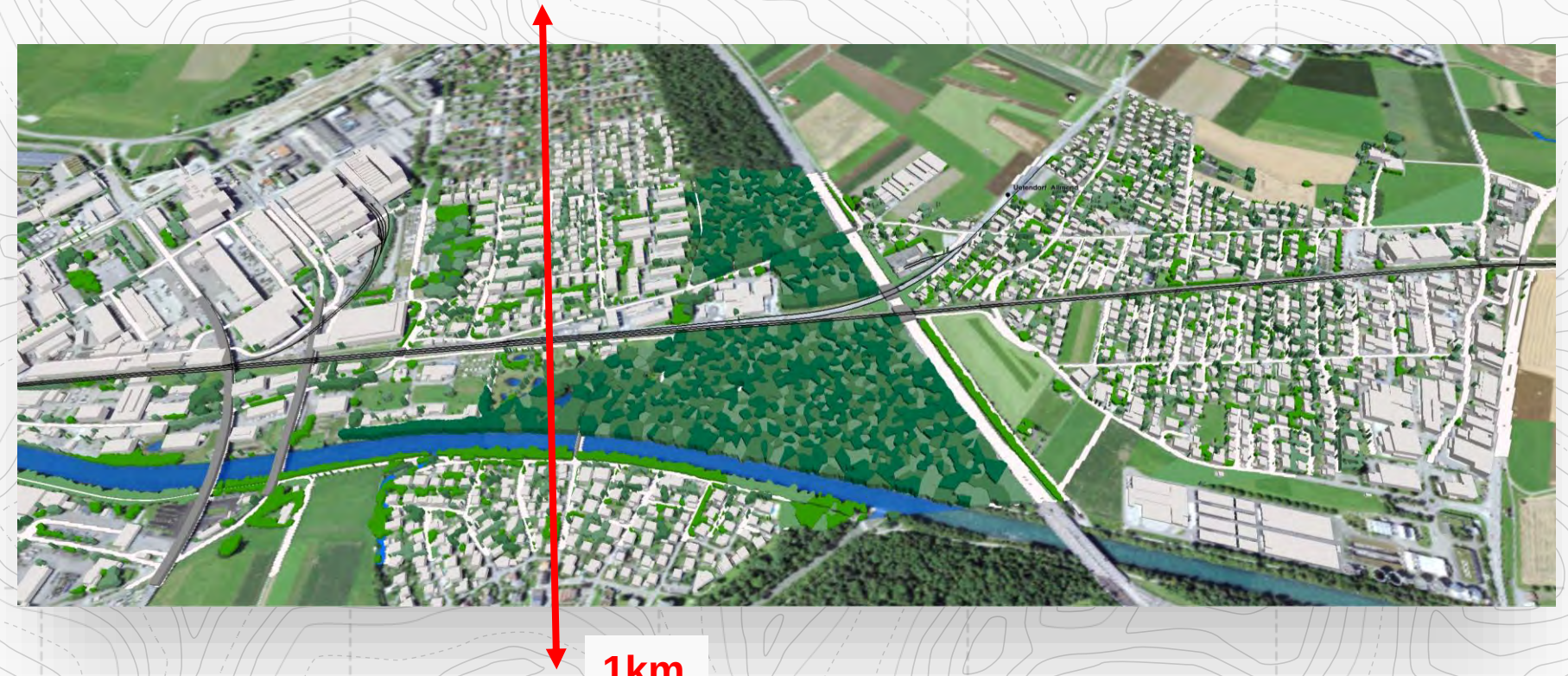
BUFFER ZONES MANAGEMENT

Railway Buffer Zones **range from 500 meters to 1 kilometers**, depending on the terrain, infrastructure, and safety standards. For example, in challenging mountainous or remote areas, larger distances may be required to ensure coverage. Dedicated 0.5km-1km buffer zone around railway tracks is used for installing 5G infrastructure, ensuring uninterrupted connectivity and real-time communication between trains, stations, and operators. This is crucial for operations in remote or challenging terrains.

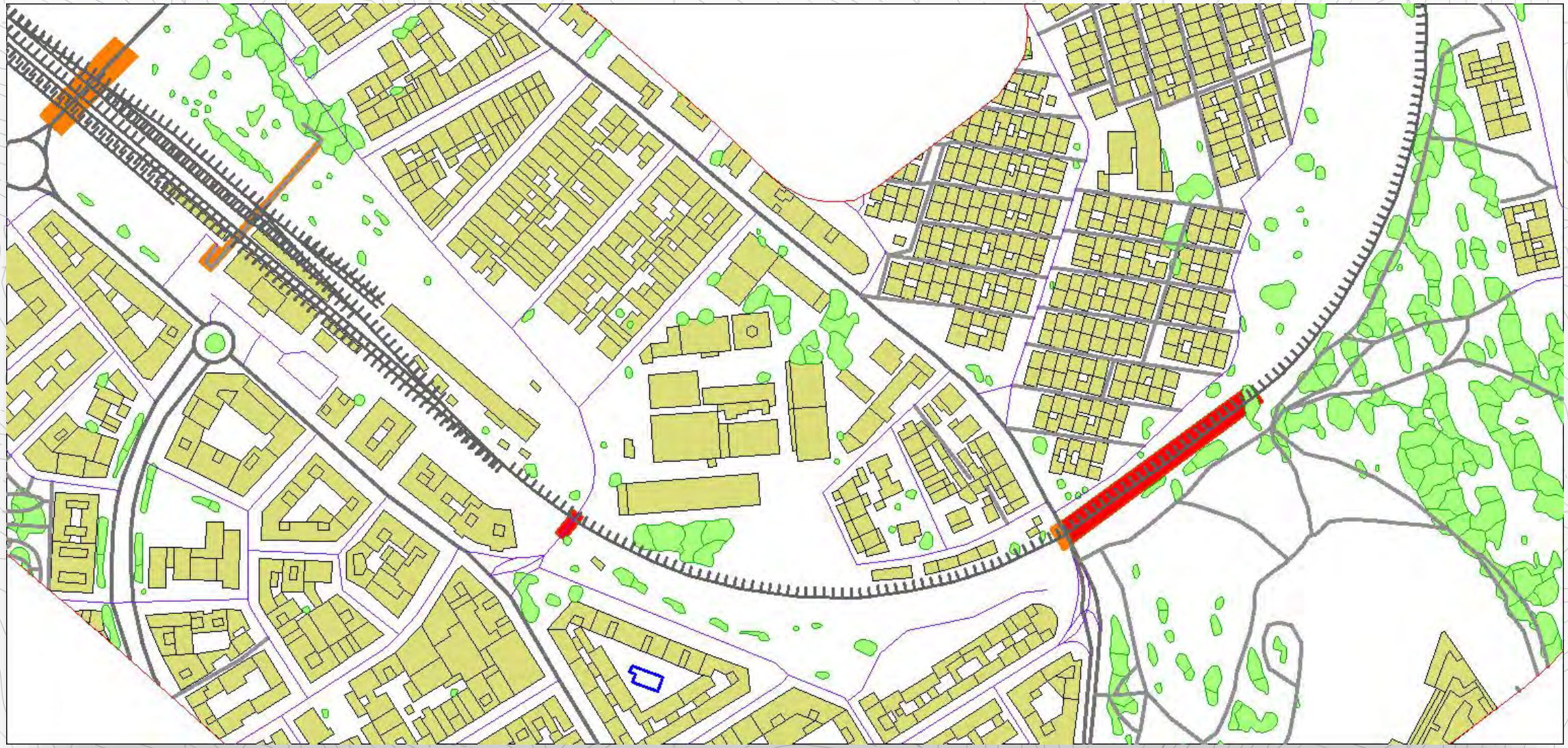
Benefits: Buffer zones optimize infrastructure placement, enhance safety, and enable seamless connectivity for critical operations in both railway and mining industries.

Importance of Buffer Zones:

- **Safety**: To reduce the risk of accidents and disasters, ensuring a safe distance from hazardous or hard-to-reach areas.
- **Technical Support**: To ensure proper functioning of the 5G infrastructure, signal coverage, and reduction of interference.
- **Environmental Monitoring**: To monitor and assess environmental impact (e.g., air pollution, noise).



3D VECTOR DATA ALONG RAILWAYS



Complete geodata coverage within a buffer zone. This zone serves as a dedicated corridor for the deployment of 5G base stations, antennas, and other equipment, ensuring seamless connectivity along the railway lines

5G IN SMART RAILWAYS

Precise 3D map data ensures you can accurately predict your 5G network coverage in complex environments and deliver the quality of service your customers expect. By incorporating **3D digital maps into the 5G-enabled railway network**, operators gain valuable insights into the physical layout of the rail system, enabling more efficient planning, maintenance, and operations. Furthermore, **3D digital maps** are basic for advanced applications such as augmented reality (AR) navigation for train drivers, predictive modeling for infrastructure upgrades, and immersive training simulations for railway personnel.

OUR 3D DATA SUPPORTS THE GROWING COMMUNICATION DEMANDS OF MODERN RAILWAY SERVICES

VISICOM 3D CITY MODELS

1M, 2M, 5M RESOLUTION MAPS

PRODUCTS FEATURES

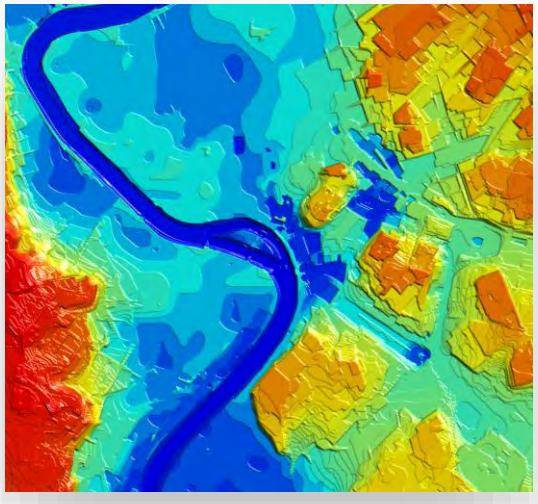
- X,Y, Z accuracy ± 3 m
- Building heights accuracy ± 3 m
- Building details: LoD 1.3.
- Represents all buildings structure
- Processing of irregular quarter's structure with high building density
- Vegetation is provided as detailed foliage, including separate trees with individual heights
- Bridges are provided with attributes of height and thickness
- Clutter classes: up to 35
- Vector classes: up to 17

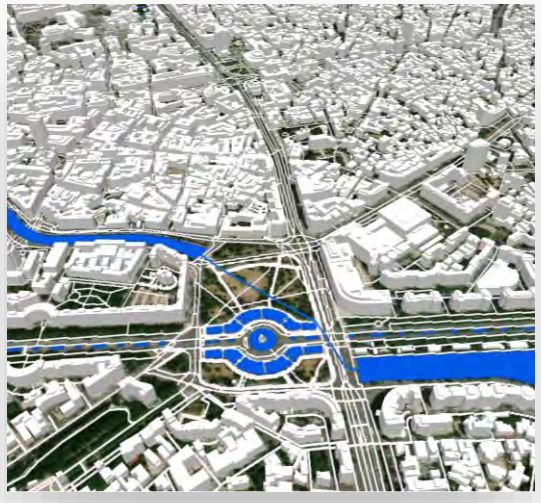
DATA FORMATS

Digital Maps are delivered in any RF-tool formats and compatible with any propagation models like Atoll Aster, Atoll CrossWave

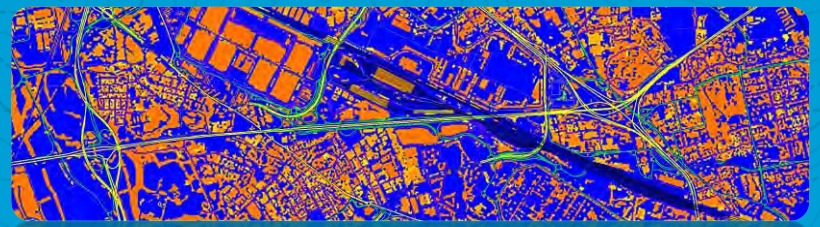
DATA VINTAGE: 2025

SOURCES: 0.3-0.5 m resolution stereo images





2.5D Mapping for Railways



2.5D DATA FOR 5G RAIL PLANNING

PRODUCTS FEATURES

- 5m resolution
- Buffer zone from 1km to 4km along the railway
- All terrain features are represented
- All artificial obstacles are included as matrix

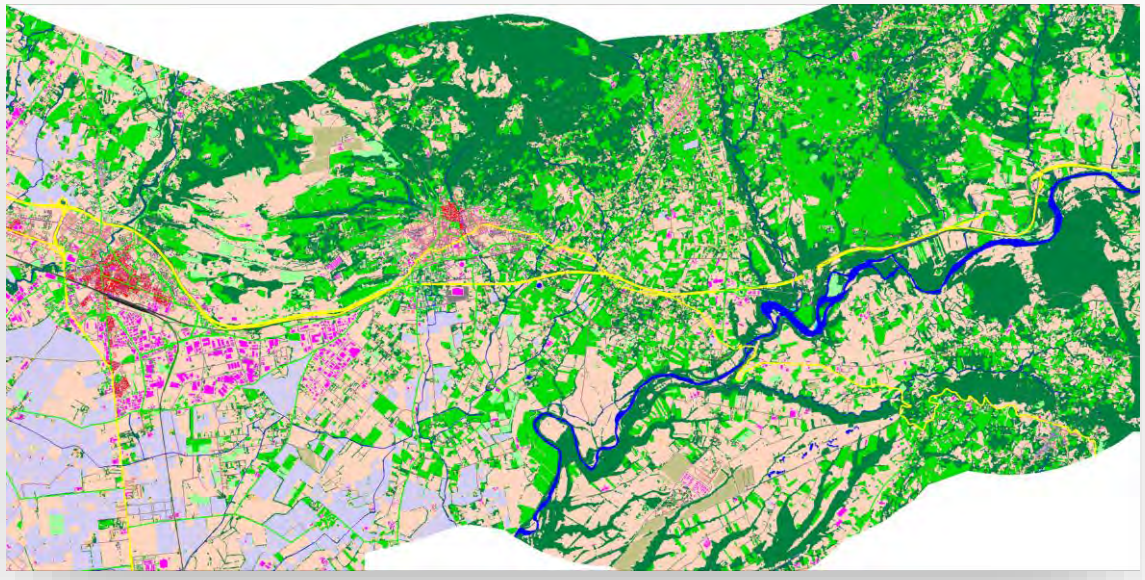
KEY BENEFITS

- Cost-Effectiveness - balance the need for detailed data with budget constraints

WHY IT MATTERS

2.5D data offers an optimal balance between detail and efficiency, making it ideal for large-scale railway coverage. It provides enhanced elevation context without the complexity or size of full 3D datasets.

As railways evolve toward smarter, more connected systems, 2.5D maps support 5G deployment by enabling accurate planning, reducing fieldwork, and improving signal reliability.



2.5D MAPS LINE

CREATED USING AI TECHNOLOGY OF SATELLITE IMAGES RECOGNITION

PRODUCTS FEATURES

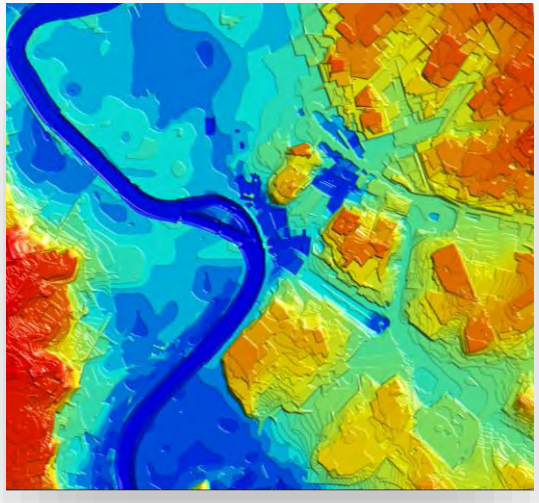
- 5m or 10m resolution
- Accurate land use classification
- Last available administrative division
- PopMap as option

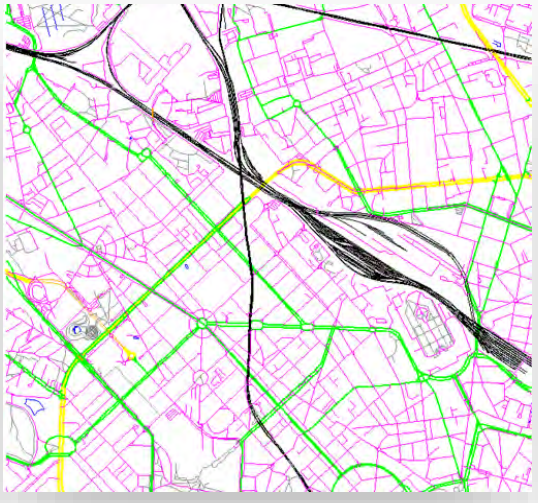
DATA FORMATS

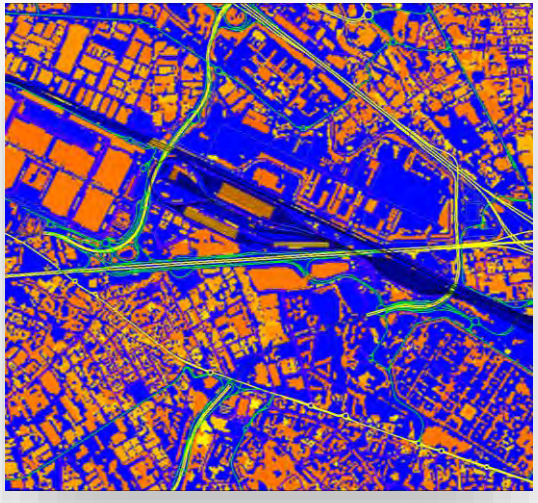
Atoll Forsk, Mentum Planet, Aircom Asset, ESRI ArcGIS, MapInfo, ICS Telecom, CelPlanner, NetPlan, Ranplan Professional, Pathloss, and any other

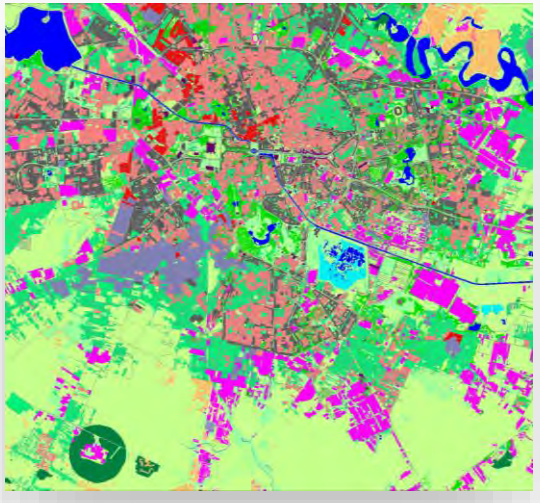
SOURCES: 2m and 5m resolution images

DATA VINTAGE: 2025









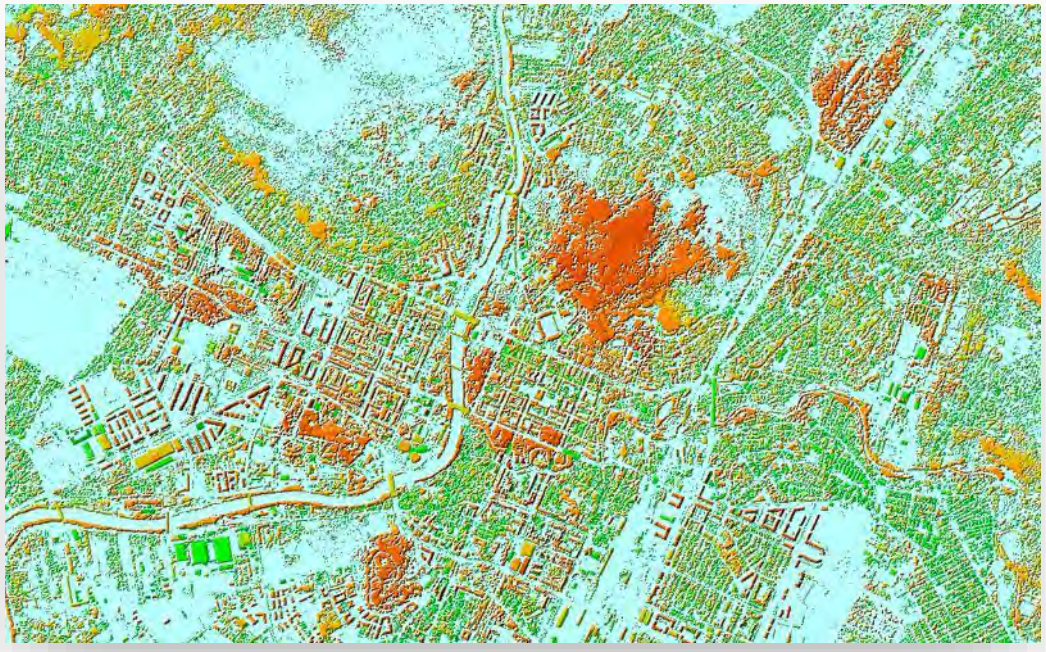
2.5D MAP OF 5M OR 10M RESOLUTION

BALANCE COST AND ACCURACY

2.5D Models are usually produced as more budget solution in comparison with 3D Models that are recommended for 5G networks planning

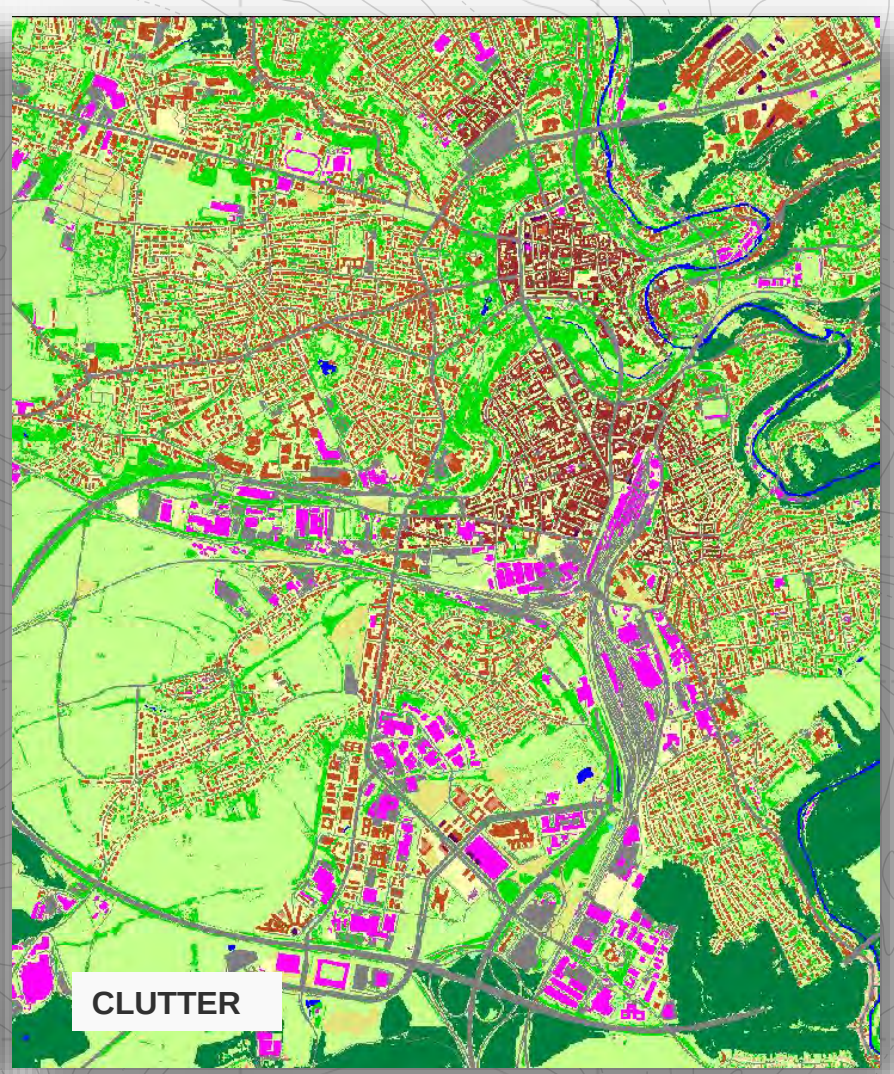
The Clutter Height layer or Digital Heights Model (DHM) is an essential part of 2.5D maps that represents the elevation differences in the terrain, providing detailed data on the height of the surface at specific points.

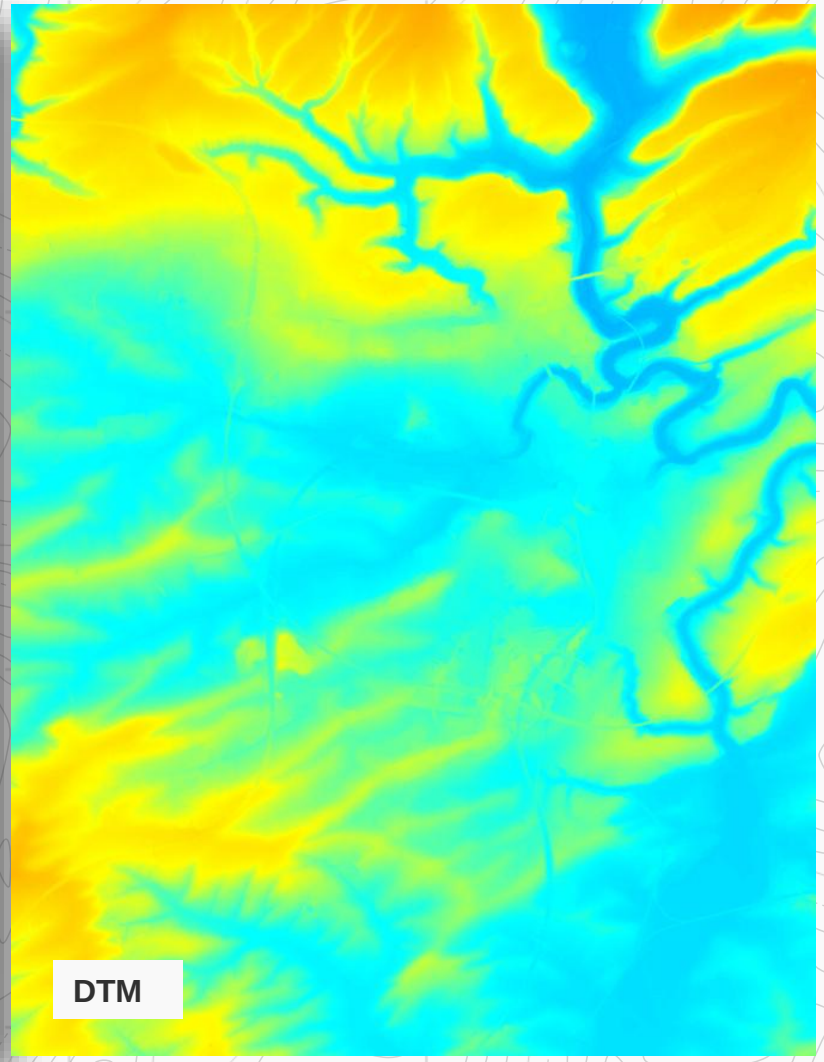
Clutter Heights model is a matrix with a height attribute defined for each pixel of clutter matrix separately as an individual value



PARAMETERS	2.5D MODEL, 5M RESOLUTION	2.5D MODEL, 10M RESOLUTION
Resolution (Cell size)	5 m	10 m
Absolute Altimetric Accuracy of DTM (Z)	5 m LE90	7 m LE90
Absolute Planimetric Accuracy (X, Y)	7 m CE90	15 m CE90
Accuracy of Clutter Heights (ch)	5 m CE90	7 m CE90
Minimal Mapping Unit for clutter	25 sq.m	100 sq.m

2.5D MAPS ALONG LUXEMBURG RAILWAYS, 5M RESOLUTION





WE UNDERSTAND THE NEEDS AND REQUIREMENTS OF RF ENGINEERS INVOLVED IN 5G RAILWAY DEVELOPMENT

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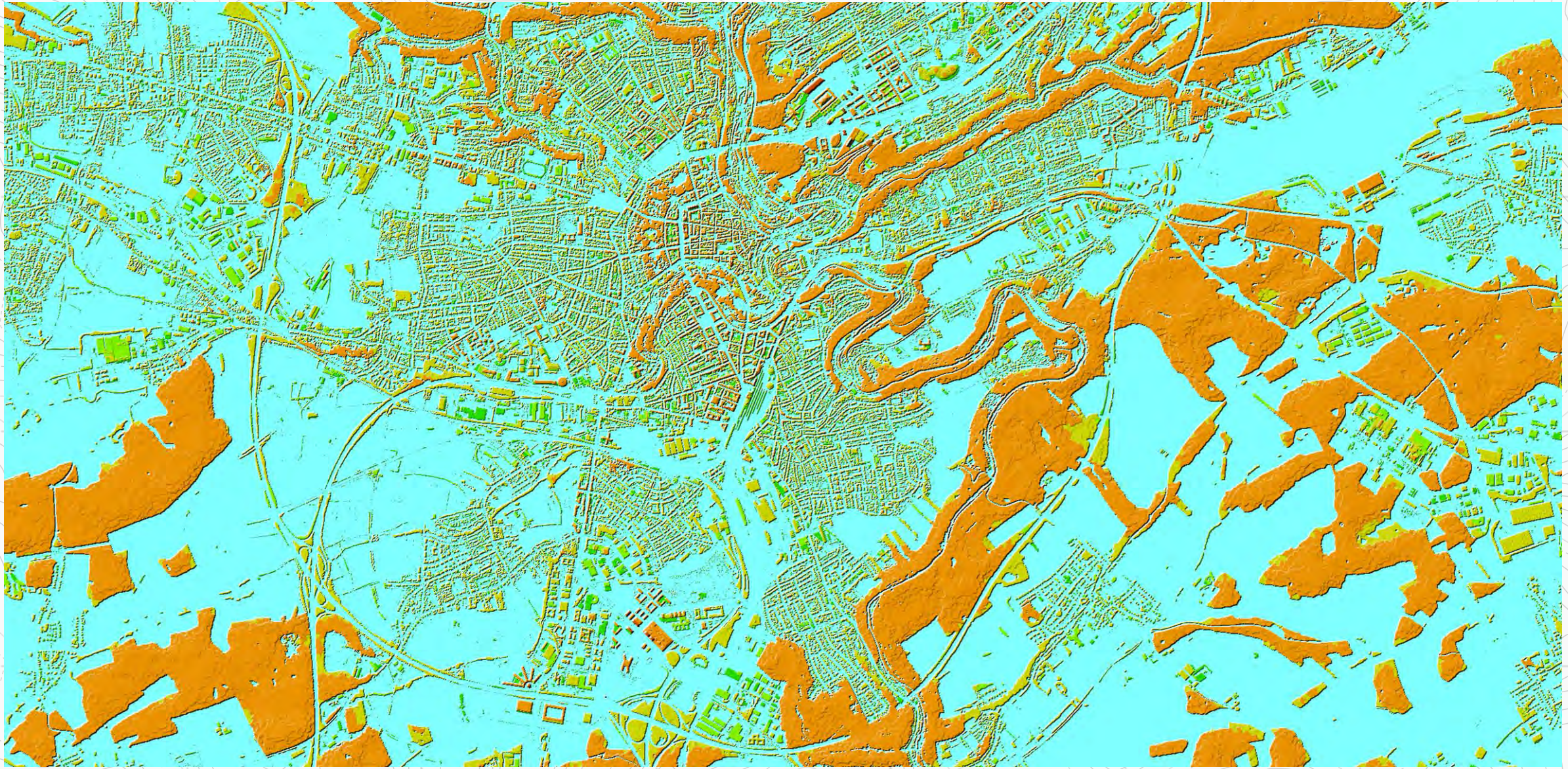
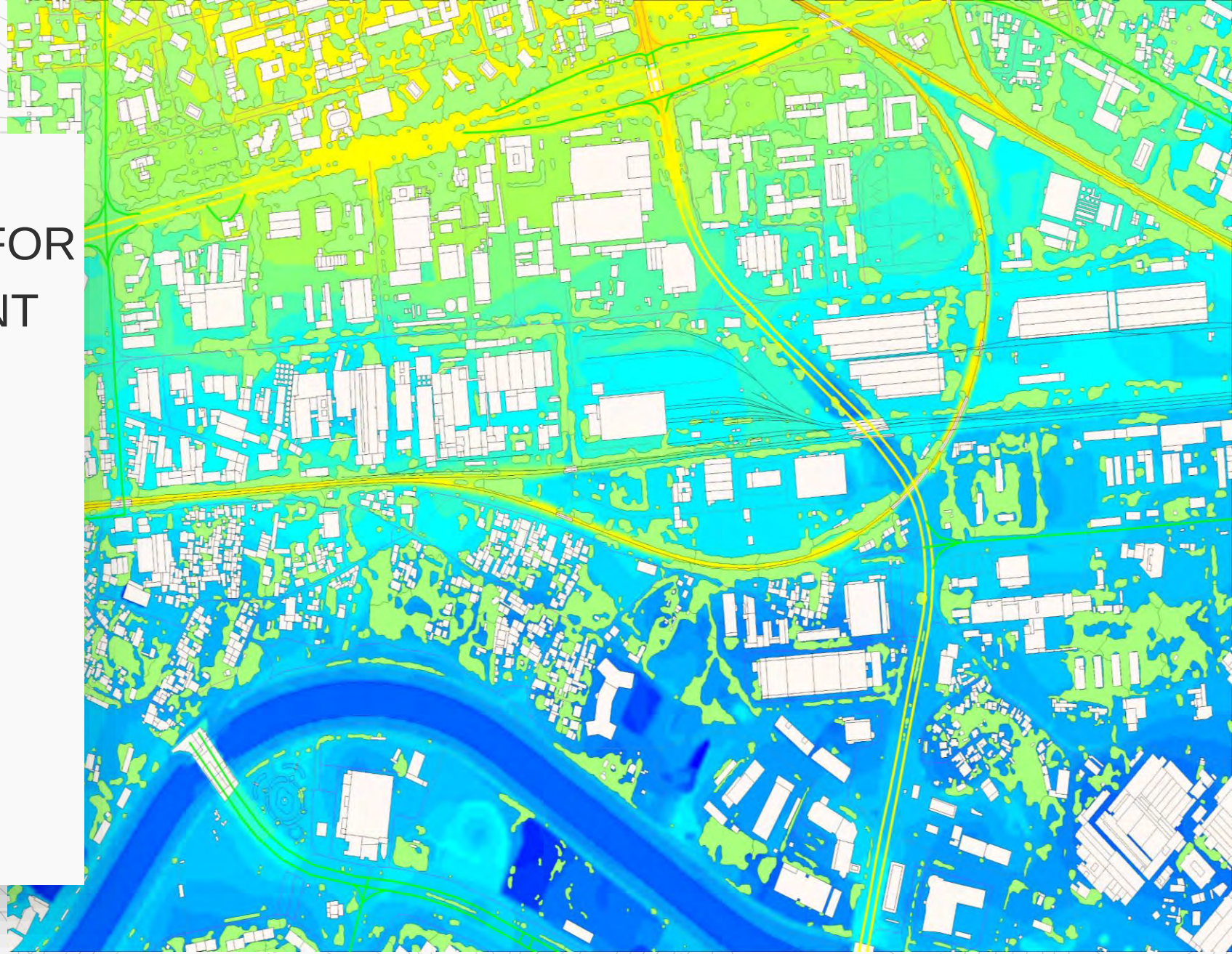
CLUTTER HEIGHT PREVIEW, 5M RESOLUTION



WE HAVE EXPERIENCE IN CREATING 3D/2.5D MAPS FOR 5G RAILWAY DEVELOPMENT ACROSS SEVERAL COUNTRIES

- ITALY
- LUXEMBOURG
- SPAIN
- SWITZERLAND
- AUSTRALIA
- GERMANY
- FRANCE



3D AND 2.5 DATA SAMPLES

EU COUNTRIES. PROJECTS OF 2024-2025

3D MODEL OF AUSTRIA COUNTRYWIDE

5M and 2M RESOLUTION

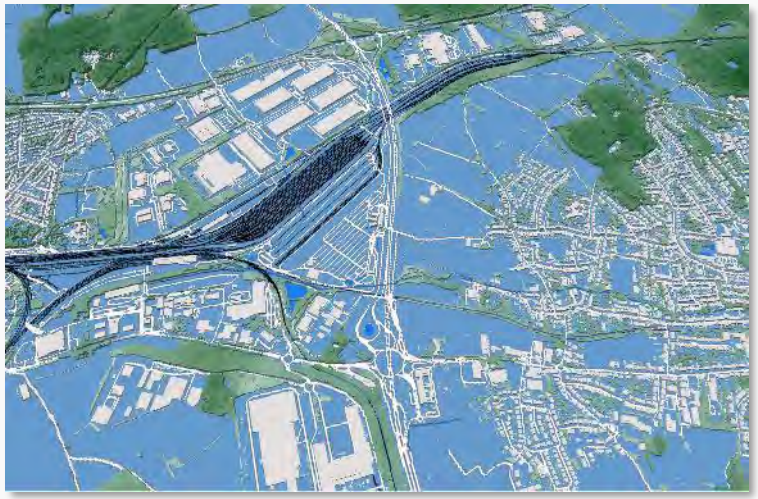
LoD 1.3 building and 3D Tree models

All railway lines are included

2.5D MAPS OF LUXEMBURG RAILWAYS

5M RESOLUTION

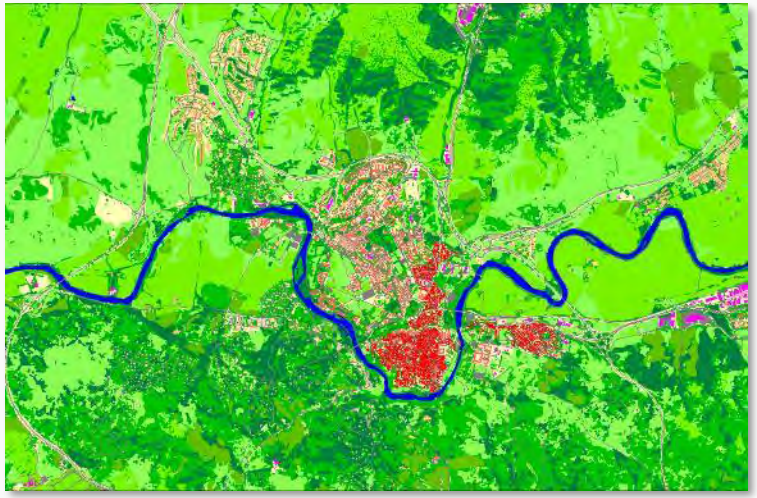
Includes 5km buffer zone surrounding the tracks. This zone serves as a dedicated corridor for installing 5G base stations, antennas, and other equipment, ensuring comprehensive coverage along the railway route



2D + 3D MAPS OF SPAIN

10M + 2M RESOLUTION

2D models of Spanish provinces for regional planning, complemented with 3D models along railway lines, 2 m resolution.



VISICOM®

OUR 2.5D AND 3D MAPS

deliver faster rollout, better decision-making, and long-term cost savings — powering the digital transformation of railways infrastructure worldwide

WHAT WE PROPOSE?

- HIGH QUALITY AND ACCURACY MAPS
- FREE DATA SAMPLE OR TRIALS
- HIGHLY COMPETITIVE AND FLEXIBLE PRICES
- MEETING ALL CUSTOMER REQUIREMENTS

READ MORE ABOUT RailGeoKit PRODUCT

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