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A precision cadastre for local
public action responding to the
challenges of the ecological
transition

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Introduction of Strasbourg

A crossroad located in the middle area of Europe



Eurodistrict Strasbourg-Ortenau



A cross-border geographical context and a merging point of German and French cultures, due to history

Strasbourg Eurometropolis

- Local authority established in 12/31/1966 as the Urban Community of Strasbourg
- Started operating in 01/01/1968
- Became Strasbourg Eurometropolis in 01/01/2015
- The territory (340 km²) is constituted on 33 municipalities members of the metropolis
- The population is 505 272 inhabitants, which represents 44 % of the French department Bas-Rhin
- 57 % of the population are living in Strasbourg city
- Since 2020 the President of Strasbourg Eurometropolis is MME. Pia IMBS



2. The creation of a multi-purpose cadastre

A century of land surveying and cadastre

1830 : « Napoleonian cadastre »
First French land registry



1890 – 1918: “Multi-purpose cadastre”
New German land registry

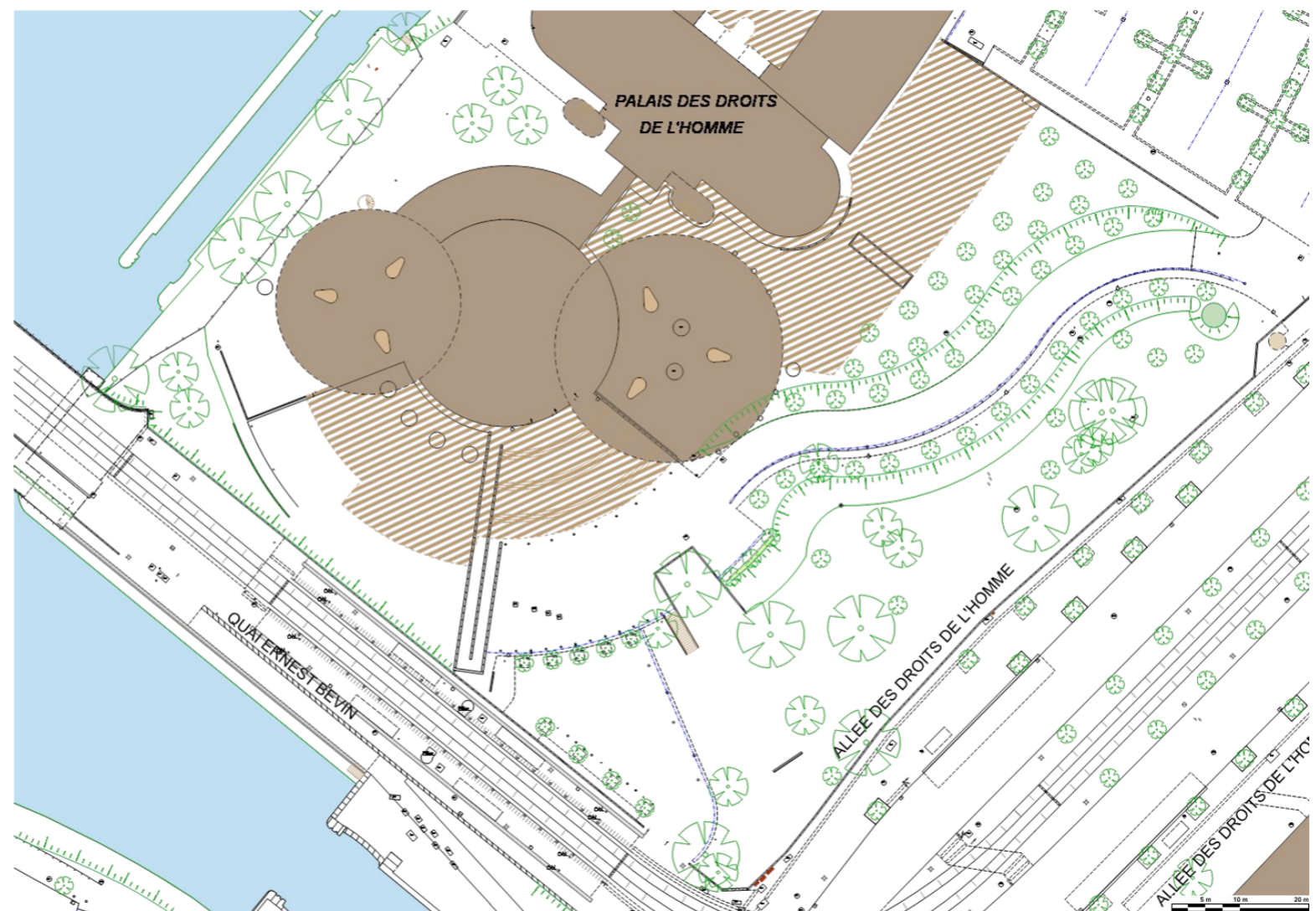
Setting a new surveying map to improve network knowledge

1972 : creation of the “streets and networks committee”, a partnership dedicated to improving knowledge of underground networks

1977-1990 : the land survey department produces 3200 background topographic map sheets at scale 1/200 and 400 maps at scale 1/500, covering the urban part of the territory

1983 : a regular updating process is commissioned for the background maps

1991 : starting of a GIS project for the Urban Community of Strasbourg (GEOCITY)



Implementing a quality GIS for the metropolis

1991-1993 : Digitizing of the topographic background maps to build land survey reference data, which will subsequently be continuously maintained and updated

1995-2000 : Streets network reference data are produced along with other intermediary scale mapping data

1996-2004 : Cadastral maps are digitized then calculated to produce land registry reference data.

1998 : First aerial photos covering Strasbourg and Kehl

2008 : GIS software renewal project (STAR-APIC)

2012 : 3D GIS project launch

2015 : experimentation of an open source complementary GIS software architecture with QGIS and PostGIS



Geometric precision

It corresponds to the deviation between map and reality. In Strasbourg, for example, the accuracy of the cadastral map is estimated at **5 cm**.

The improvement of surveying techniques, and in particular spatial positioning (GNSS), has made it possible to improve the geometric accuracy of the cadastral map.



Compliance with topology rules

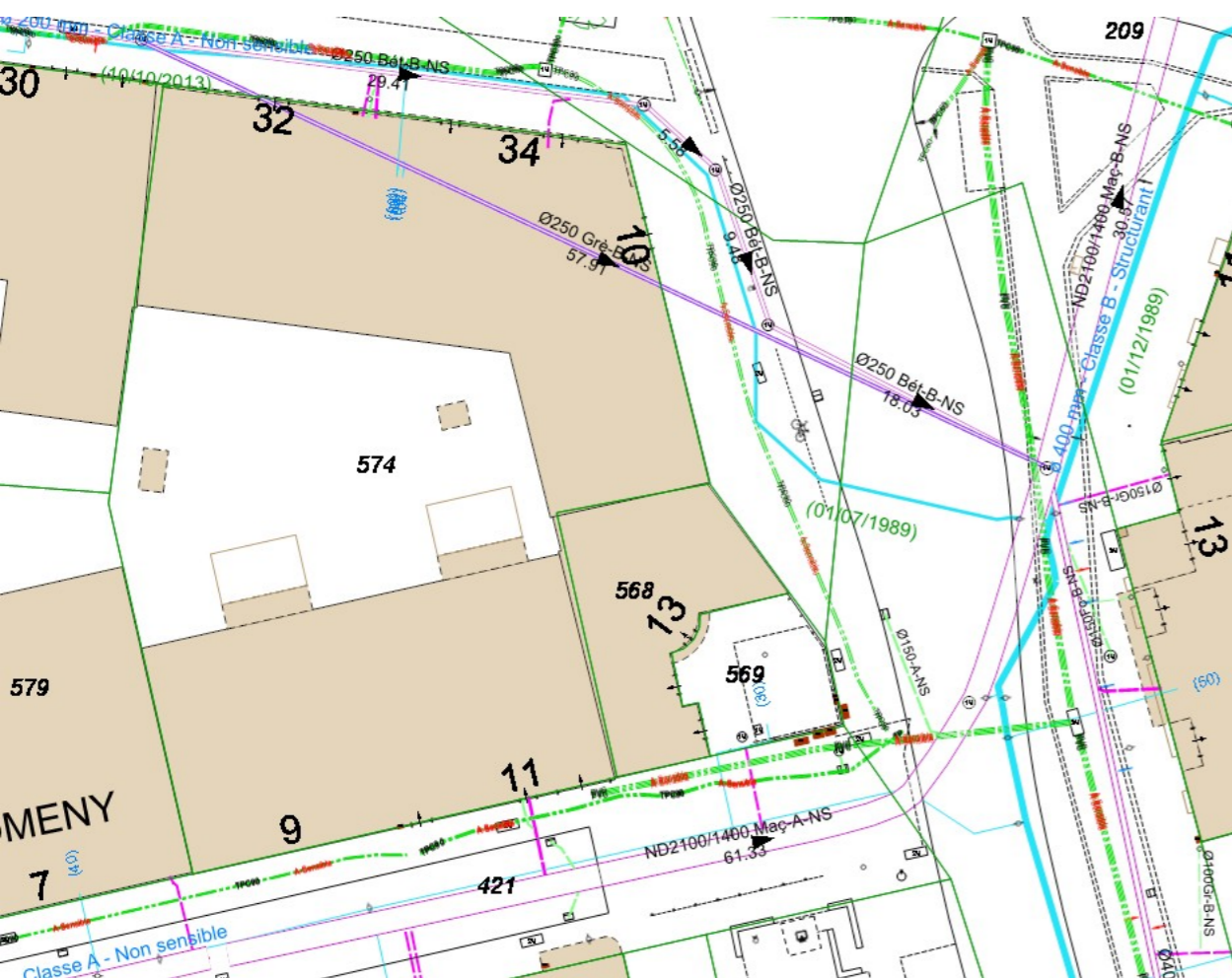
These rules are mainly characterized by the absence of gaps or overlaps between municipalities polygons and by the correspondence of land units vertices with associated cadastral landmarks

4. What is a precision cadastre ?

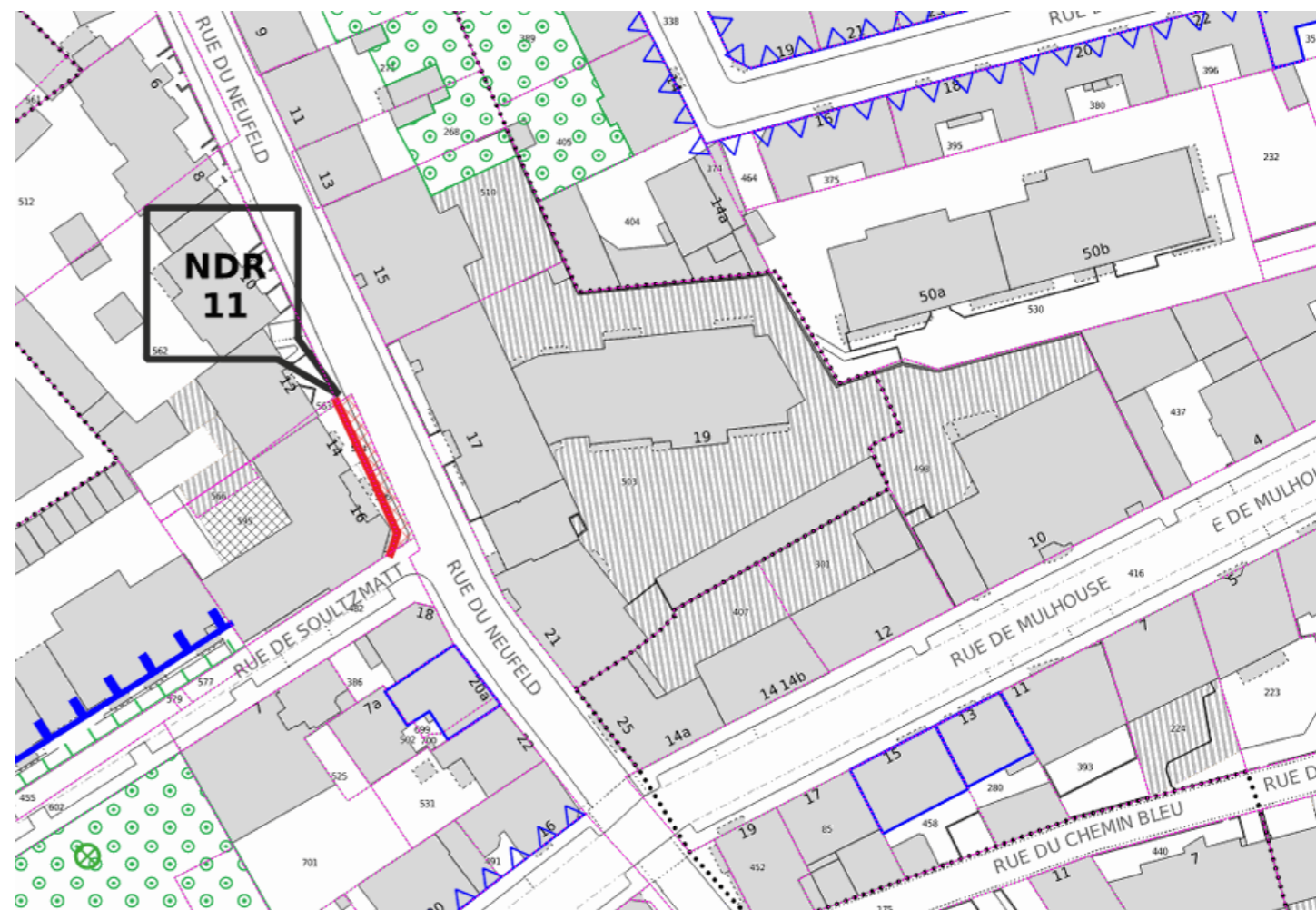
Data consistency

For a reliable data overlay it is necessary to have a spatial and geometrical consistency.

This can be achieved in particular by using a single plan (topographic or cadastral) as the base for the other data



example of an overlay of cadastral, topographic and utilities data



example of an overlay of cadastral, topographic and urban planning data

4. What is a precision cadastre ?

Keeping data up to date

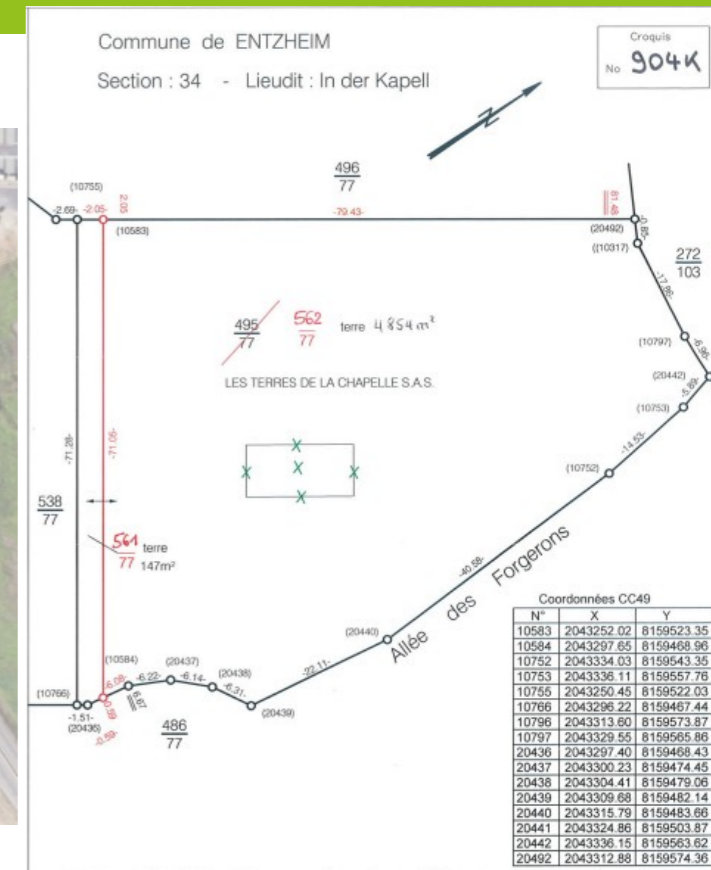
Another important quality feature is the frequency of data update.

Data should be as up-to-date as possible and users must be informed of the date of the data

With modern surveying technologies and CAD it is nowadays possible to set up a fully digital updating chain from field to GIS.



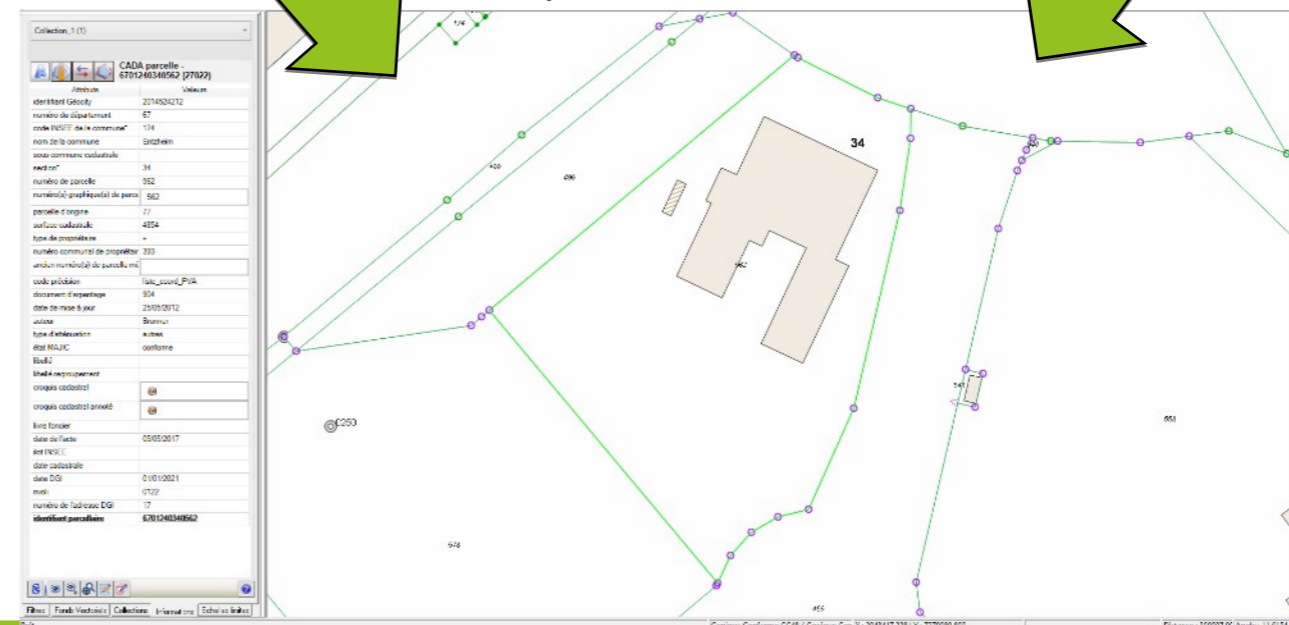
direct use of CAD data of the land surveyors (screenshot of the "Geofoncier" platform)



use of technical sketches of the land surveyors



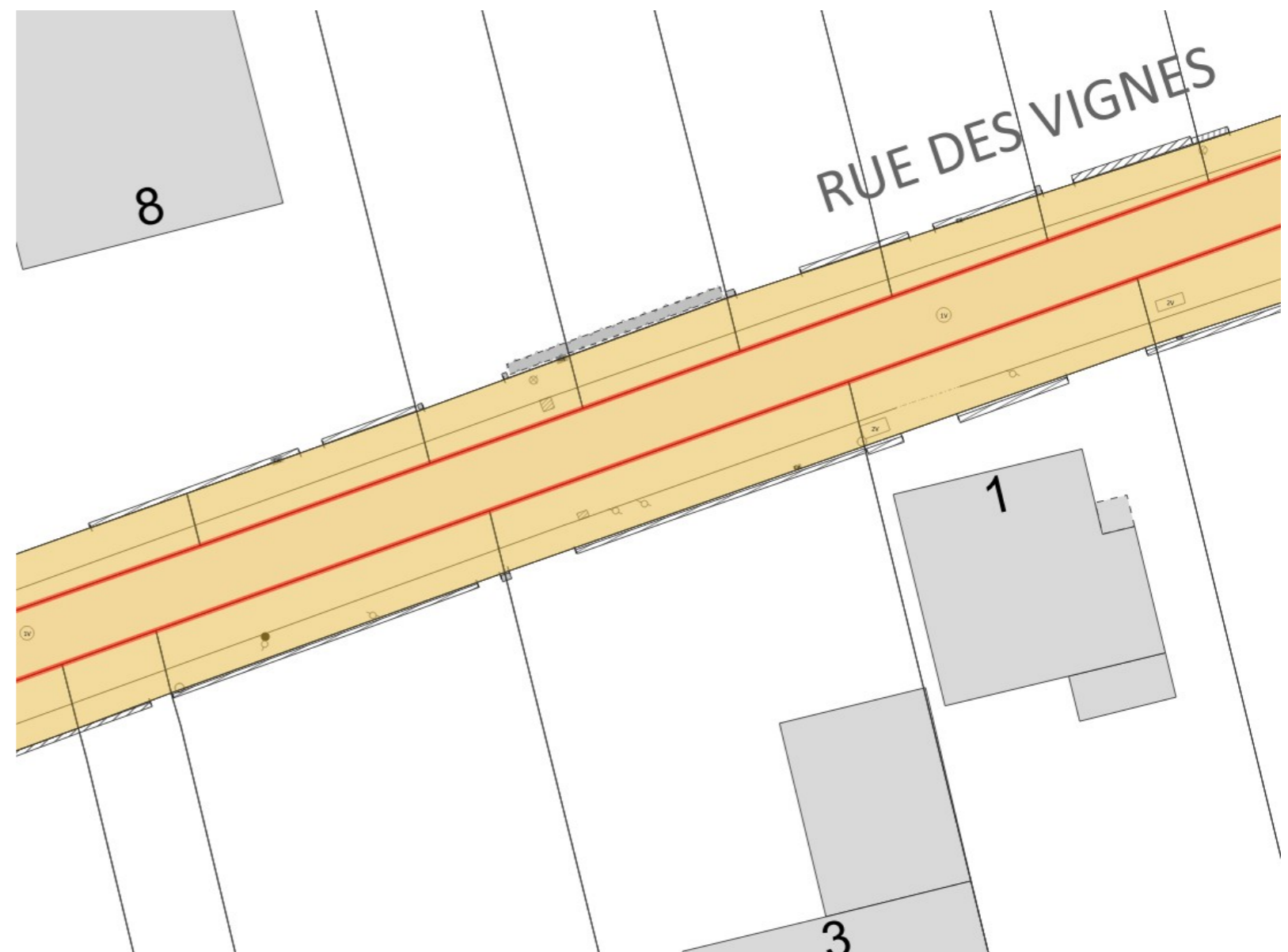
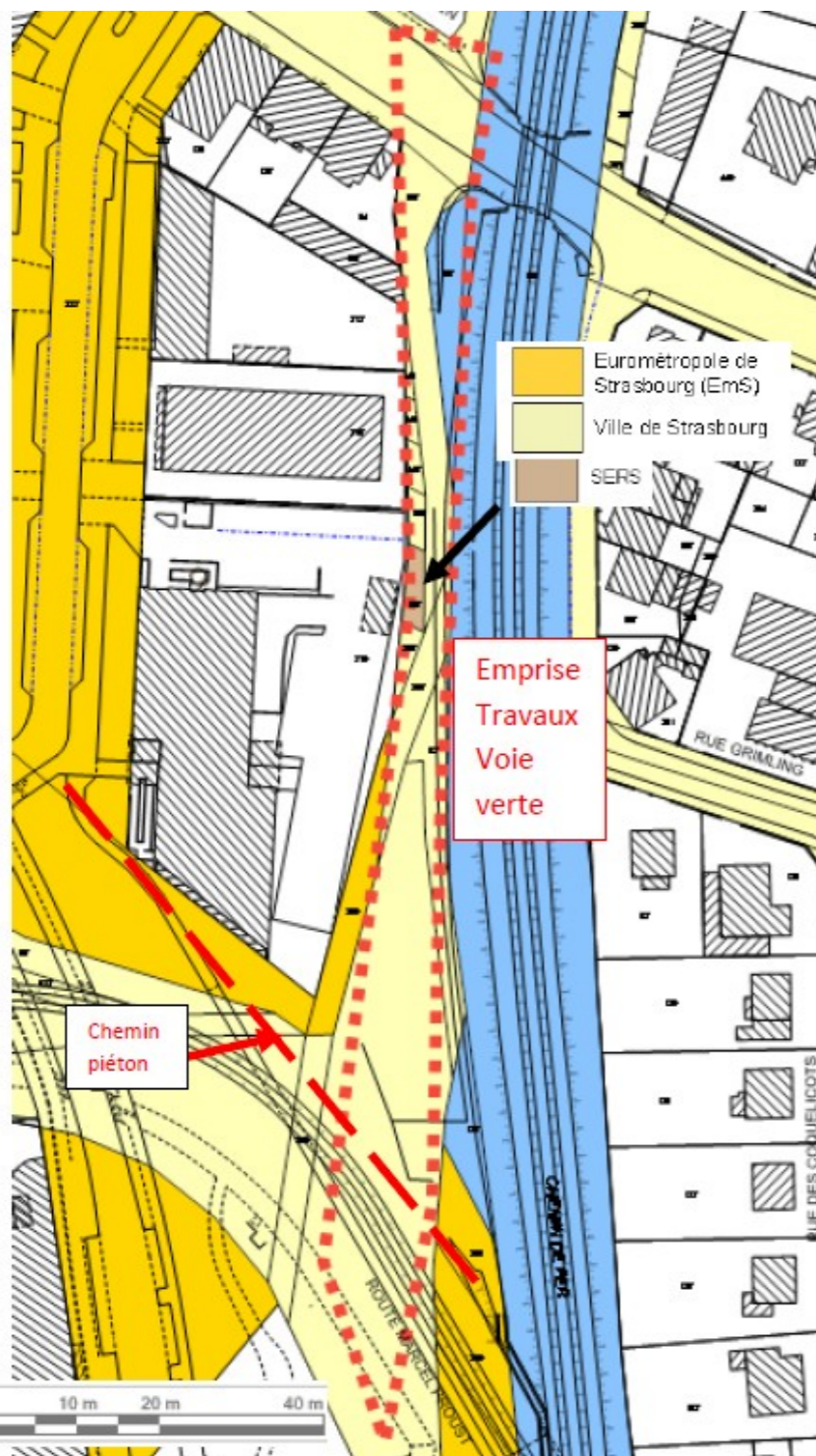
to update of the GIS data



4. What is a precision cadastre ?

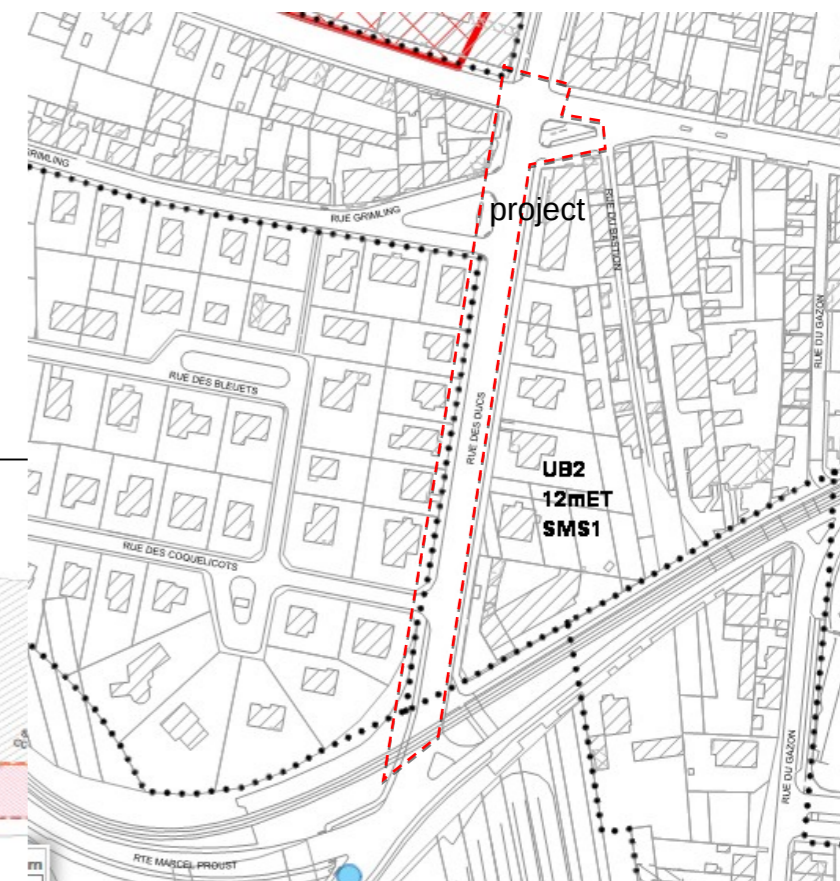
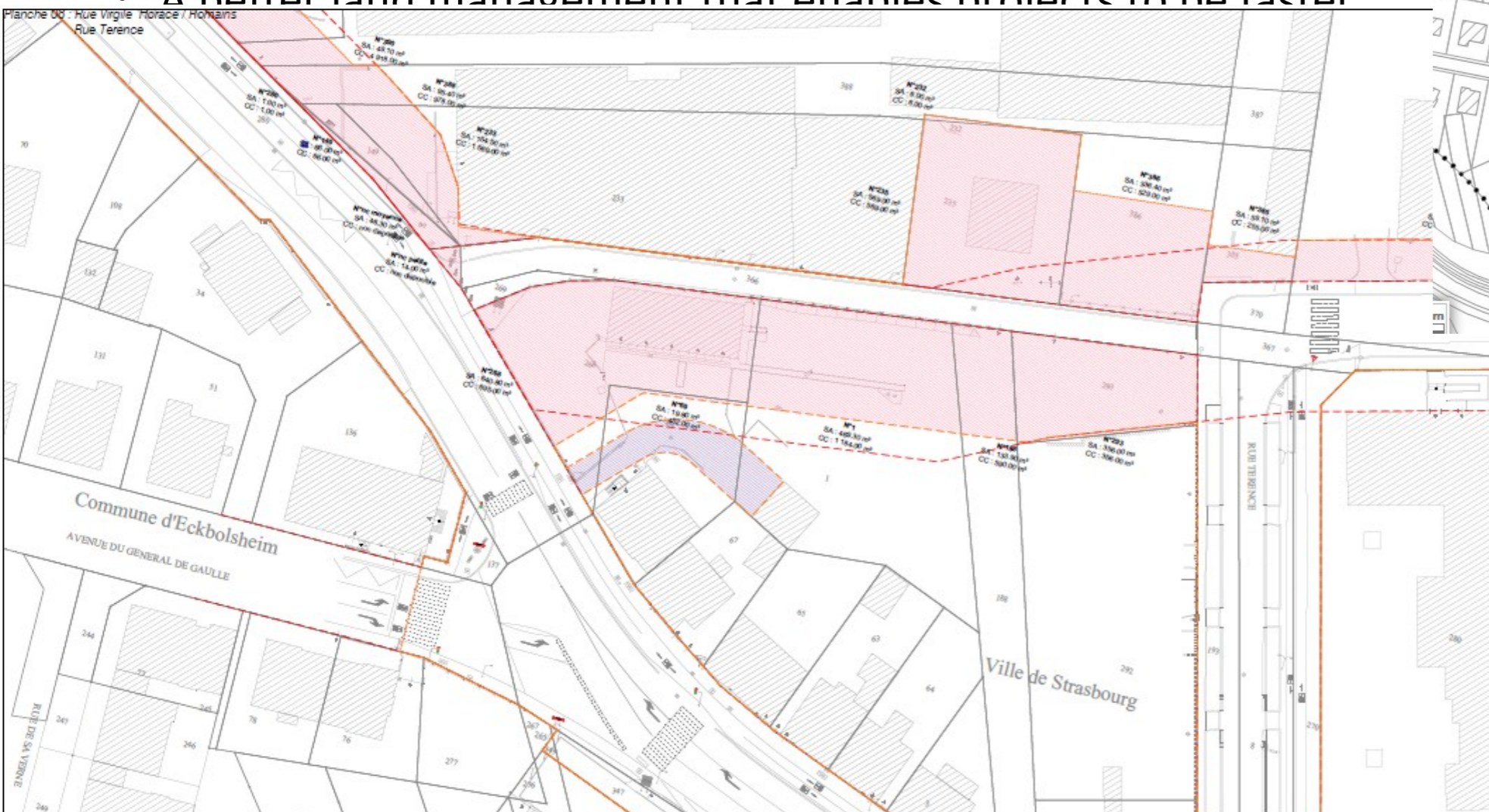
Legal correctness of data

Overlaying high precision cadastre and topography allows to accurately delimit public domain which is important when a regularization of the public domain is needed.



Ease of management of projects on urban public space

- An important support for decision-making
- a reliable support for the realization of preliminary designs
- Better and easier compliance with local development plan
- A better land management that enables projects to be faster



A precise regulatory urban planning

3D data and the urban plan data make it possible to calculate the potential for raising buildings. Combined with the cadastre, this information allows the identification of sectors and public owners who could increase the density of buildings

Map of building raising potential in the GIS



Examples of elevation potential (source UpFactor)

A precise regulatory urban planning

It is a useful tool for the monitoring of soil artificialization and impermeability

Combined with data on land use and imperviousness, the cadastre makes it possible to calculate statistics on the evolution of land use.



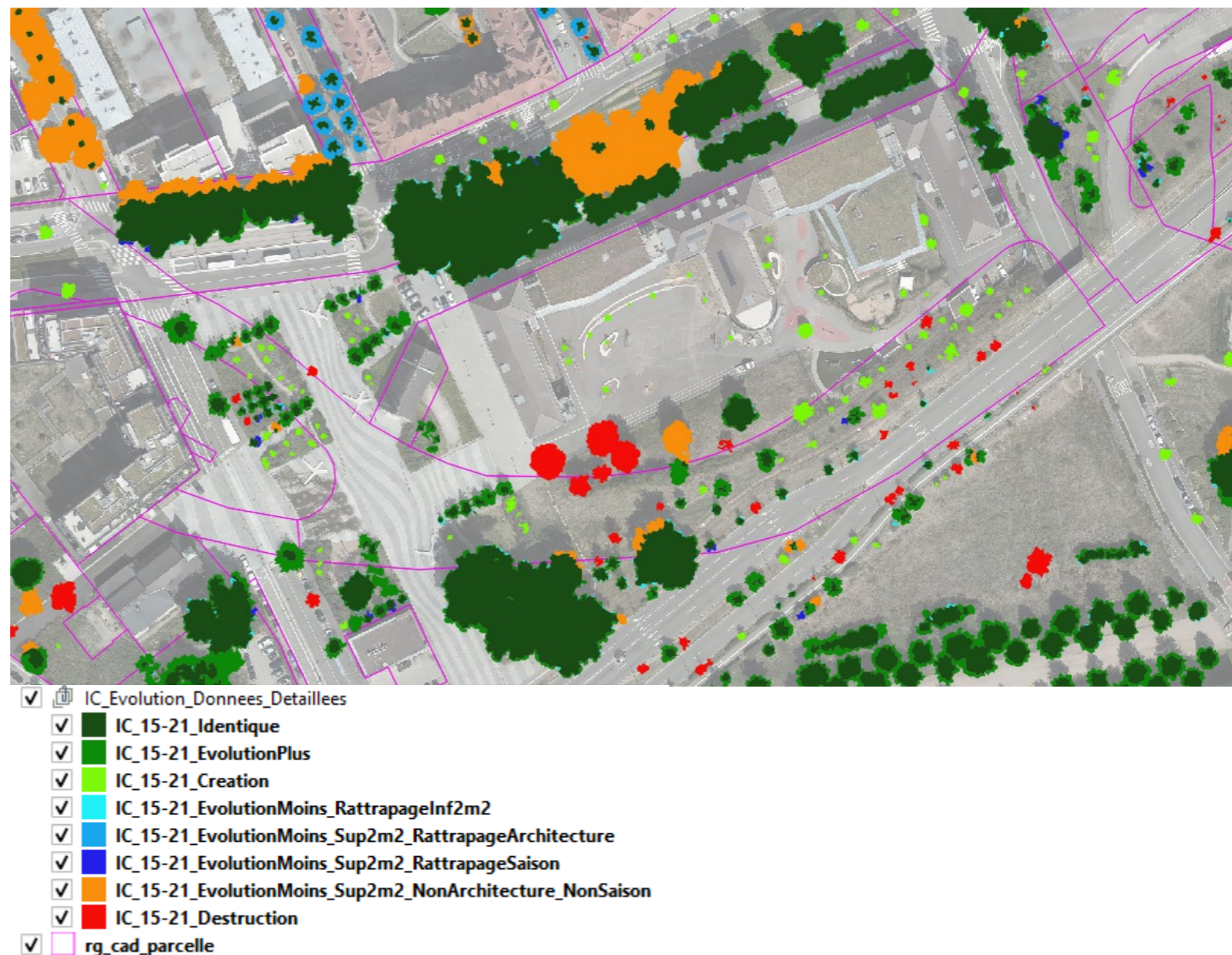
Surfaces in m ²	2012		2017	
built-up area	3325	30%	2318	20%
grassland	1267	11%	4531	40%
woodland	6704	59%	4447	40%

Designing public action for ecological transition : the Canopy plan

A high-density classified lidar can identify trees. Coupled with other data such as the cadastre, land use, and underground utilities, this makes it possible to identify locations for planting new trees for the canopy plan.



Evolution of the canopy between 2015 and 2021 with the cadastre in pink



A precision Cadastre is necessary but not sufficient...

...to face the challenge of the environmental changes

- All the data of the GIS are needed
- Specifically 3D data are very important (LIDAR..)
- Ground usage and land cover are also required

The better the precision, the more reliable the uses

- The aim is to get as close as possible to the real topography of the field
- In order words : to bring fiscal delimitation of properties closer to legal delimitation

A key feature : public domain cadaster

A cultural exception of the Alsace Moselle region that prove itself priceless for land management and land control of the public domain

Thank your for your attention

More too see on the GIS of Strasbourg metropolis :

<http://sig.strasbourg.eu/> and <http://www.data.strasbourg.eu/>



Cadastre over 3D Photomesh show buildings on limit (yellow)