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Methodology to ensure consistency of data between cadastral map and orthophotos

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CONTENT

- Overview of Cadastral Map
- Development of Cadastral Map
- The usage of Cadastral Map
- Consistency of data between Cadastral Map and orthophotomap

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CADASTRAL MAP (1)

- The National Real Estate Cadastre Information System (Cadastre) consists of two parts – textual and graphical part - Cadastral map

- Cadastral Map is digital overview map of mutual placement of land parcels, buildings, parts of land parcel and servitude roads

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CADASTRAL MAP (2)

The main basic principles of the Cadastral Map are the following:

- covers whole territory of the Republic of Latvia
- is obtained by method of justification of boundaries
- serves as overview on location of land parcels, buildings, parts of land parcel and servitude roads
- is maintained continuosly and up-to-date status

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CADASTRAL MAP (3)

Cadastral Map consist of:

- Land parcels
- Buildings
- Parts of land parcel
- Servitude roads

Identifyer is depicted for all objects

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CADASTRAL MAP (4)

- Land parcels displayed on the Cadastral map according to cadastral survey accuracy, taking into account the higher accuracy of the cadastral survey data and subject to the following priorities:
  - surveyed land parcels
  - allocated land parcels
  - designed land parcels
- Surveyed objects of the Cadastral map are depicted from border plans of properties
- Allocated and designed objects of the Cadastral map are delineated from photoplan, ortophotomap and topographical map and graphical appendix of municipality's act

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DEVELOPMENT OF CADASTRAL MAP (1)

- In 1993 there is a beginning of the Cadastral Map, allocating boundaries of land parcels were depicted on photoplan by surveyors themselves
- In 1995 there is a beginning of depiction of boundaries of land parcels on manual Cadastral Map. Particular cities start to use digital technologies
- In 1998 there is a beginning of introduction of digital Cadastral Map for the whole country. The main target was overtook 100 % overlay of land parcels
- There is an inception of depiction of buildings on the Cadastral Map in 1999, at the beginning there were depicted surveyed buildings only, obtained by making use of surveying data. Since year 2001 also ortophotomap and topographical maps are used for depiction of buildings

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DEVELOPMENT OF CADASTRAL MAP (2)

- In 2000 there is an inception of use of ortophotomap for management of the Cadastral Map and allotment of boundaries of property
- In year 2001 the registration part of land parcel is started on the Cadastral Map in common with registration of leasehold objects Cadastre
- Depiction of servitude roads on the Cadastral Map has been started since 2003
- Since 2003 Cadastral Map is available on the internet

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DEVELOPMENT OF CADASTRAL MAP (3)

- In 2011 new software for linking of textual and graphical part of Cadastre was implemented. Data store in Oracle Spatial database, the specially designed application is based on Bentley Microstation. The geometry of objects are stored as polygon in the database, but land parcels also have information on each border – border along river, border along road, border between border points etc.

- Since 2012 main focus on comparison of data between Cadastral Map and textual part and error correction

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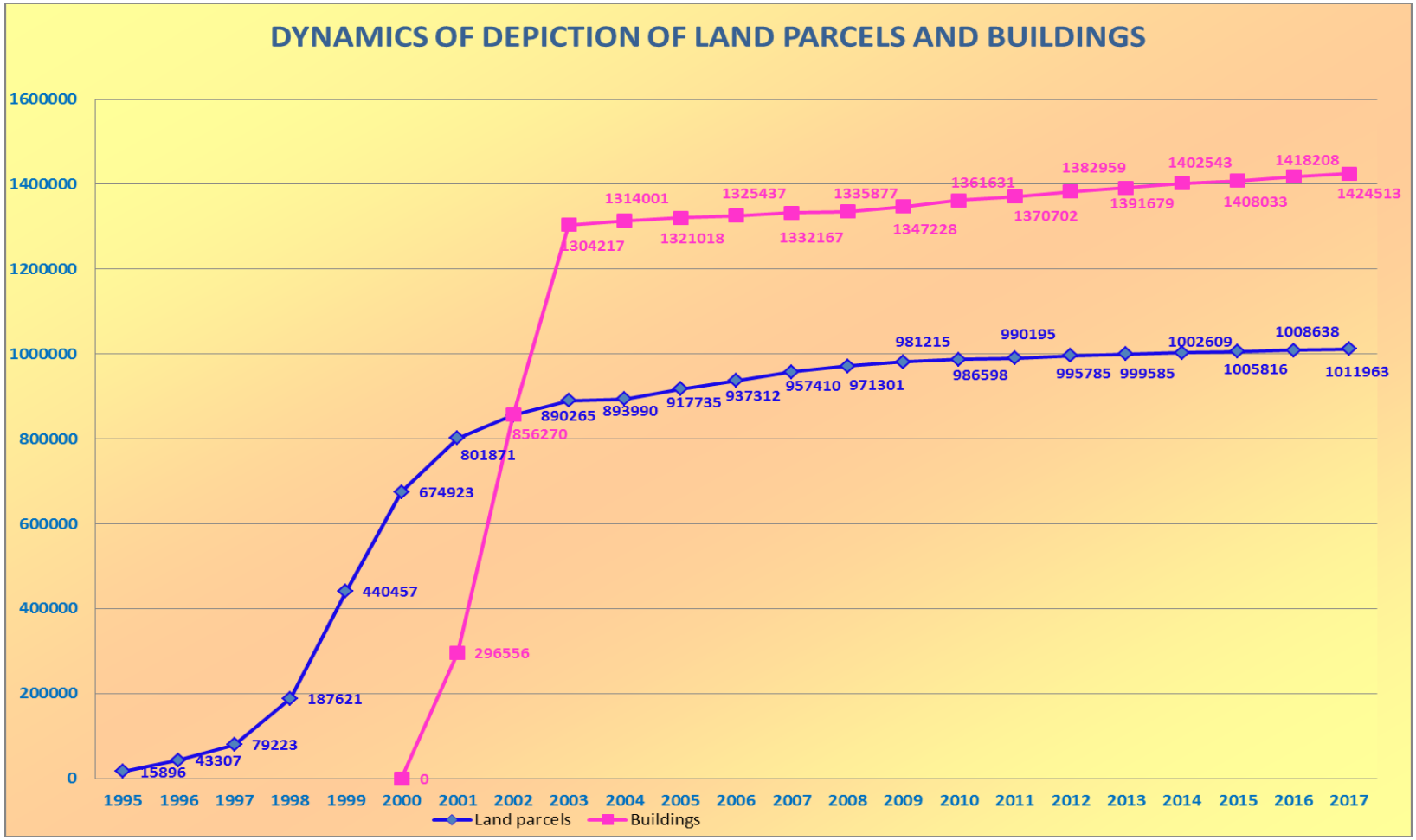
DEVELOPMENT OF CADASTRAL MAP (4)



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DEVELOPMENT OF CADASTRAL MAP (5)

Completeness of Cadastral Map:

- Land parcels 100 % (1.01 million) of registered in textual part;
- Buildings 99.1 % (1.42 million) of registered in textual part
- Parts of land parcel 70 % (6 thousand) of registered in textual part
- Servitude roads 61 % (161 thousand) of registered in textual

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THE USAGE OF CADASTRAL MAP (1)

- The Cadastral Map is essential component in territory planning of municipalities
- Since year 2002 there is rapid increase in public interest on data of the Cadastral Map and the cadastral data are being used in different economic sectors
- There is in-depth cooperation with State Forest Service which makes use of the data of the Cadastral Map for establishment of forests fund and for management of forest valuation. State Forest Service use Cadastral Map as base for the State forest register GIS
- Rural Support Service use data of the Cadastral Map for administration of payments to farmers
- The data of the Cadastral Map are used for planning environmental protection activities and for administration of protected nature territories

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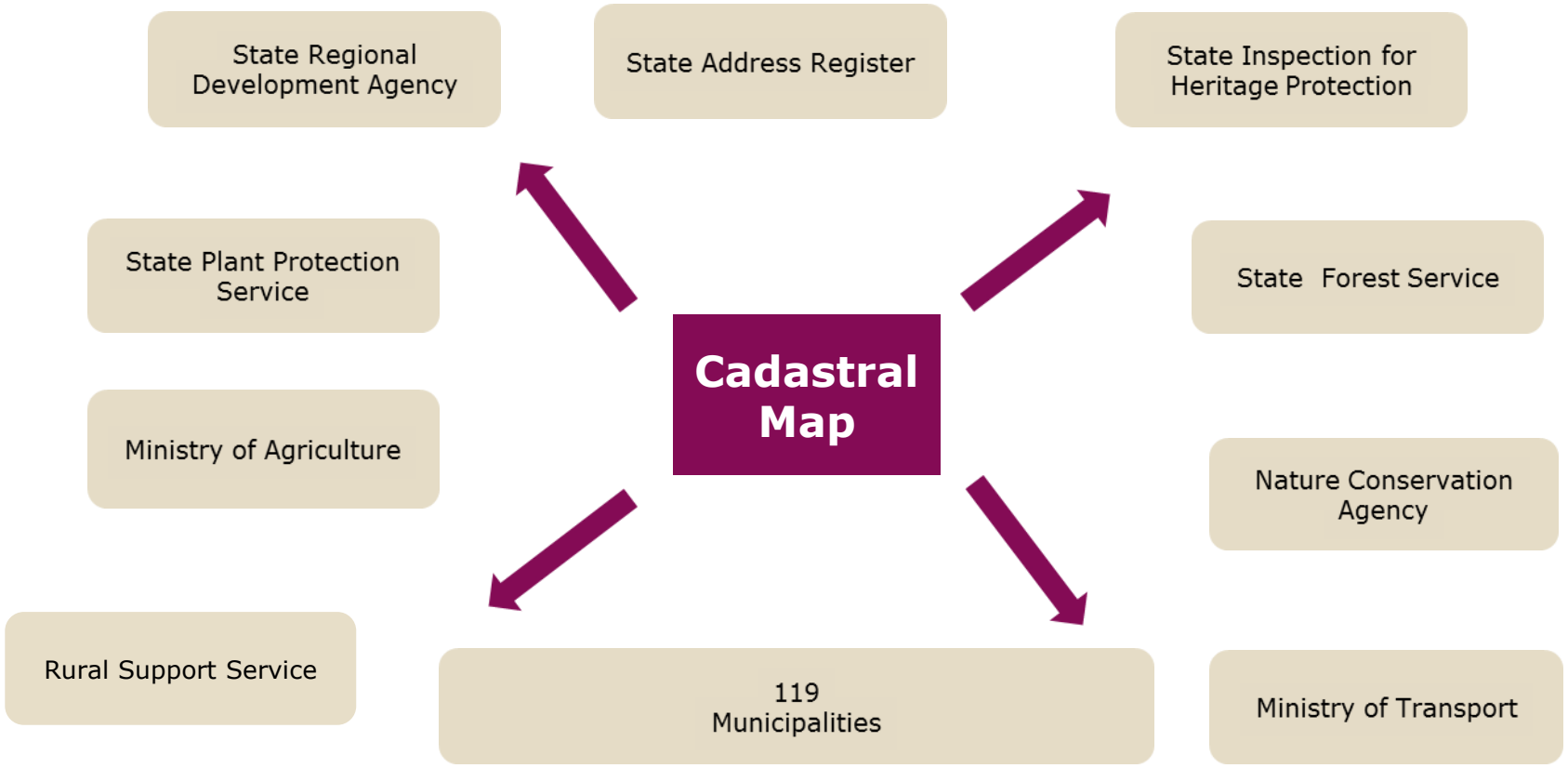
THE USAGE OF CADASTRAL MAP (2)



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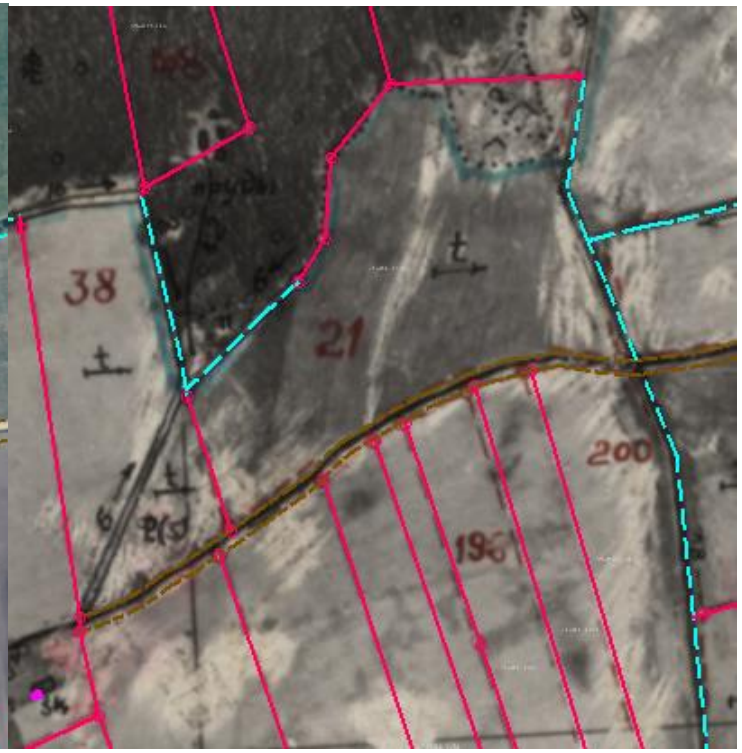
CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (1)

Cartographic base of Cadastral Map – orthophotomap and photoplan

Orthophotomap 2013-2015



Photoplan

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CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (2)

- The main reason to evaluate and improve data consistency of data between Cadastral Map and orthophotomap is Restricted Territories Information System
- In 2016 was implemented software for Restricted Territories Information System and data are accumulated
- In the future it is planned that data layer «restricted territory» from Restricted Territories Information System and Cadastral Map data layer «land parcel» will cut and get encumbrances and will be registered in the Cadastre Register

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CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (3)

- In order to improve the positioning accuracy of land parcels, in 2016 was conducted analytical work on the assumption - if the road splits land parcel into two land parcels, the possible border location of the land parcel can be specified

- Therefore, was cut into two geodatabase Cadastral map and LGIA Topographic map 1:10 000
- Was cut two data layers – polygons of land parcels with polygons of road
- If road cutting land parcel divided into two parts, it was seen as a potential area requiring clarification
- We are using the Snipping Tool Geoprocessing CLIPPER (ArcMap)

Result – table of land parcels

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CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (4)

- This process refers to allocate and design land parcels
- The borders updating process on ortophotomap consist of:
- Identification of land parcels where are necessary of update (manual or semi-automatic)
- Exploration of cartographic base - recognize road reconstruction
- Exploration of delimitation acts – to find out of border distance to the axis of the road
- Exploration of the axis of the road
- Making a decision – update border of land parcel or not
- Border design according to delimitation acts and border plans of properties on base of ortophotomap

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CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (5)

Identification of land parcels where it is necessary update

Orthophotomap 2013-2015

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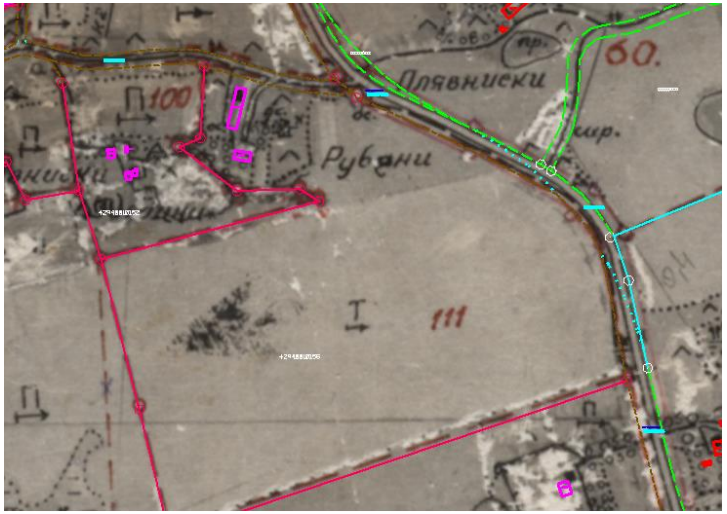
CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (6)

Exploration of cartographic base - recognize road reconstruction



Photopolan

Orthophotomap 2003-2005

Orthophotomap 2013-2015

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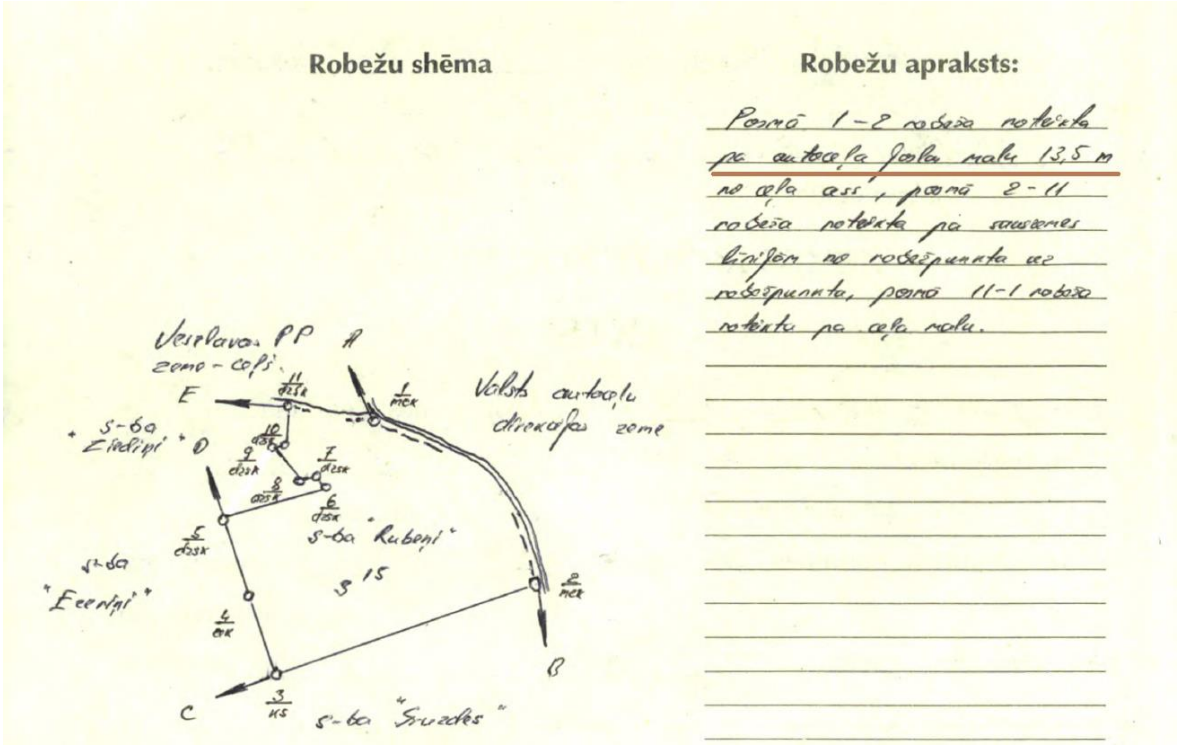
CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (7)

Delimitation acts exploration – to find out border distance to the axis of the road



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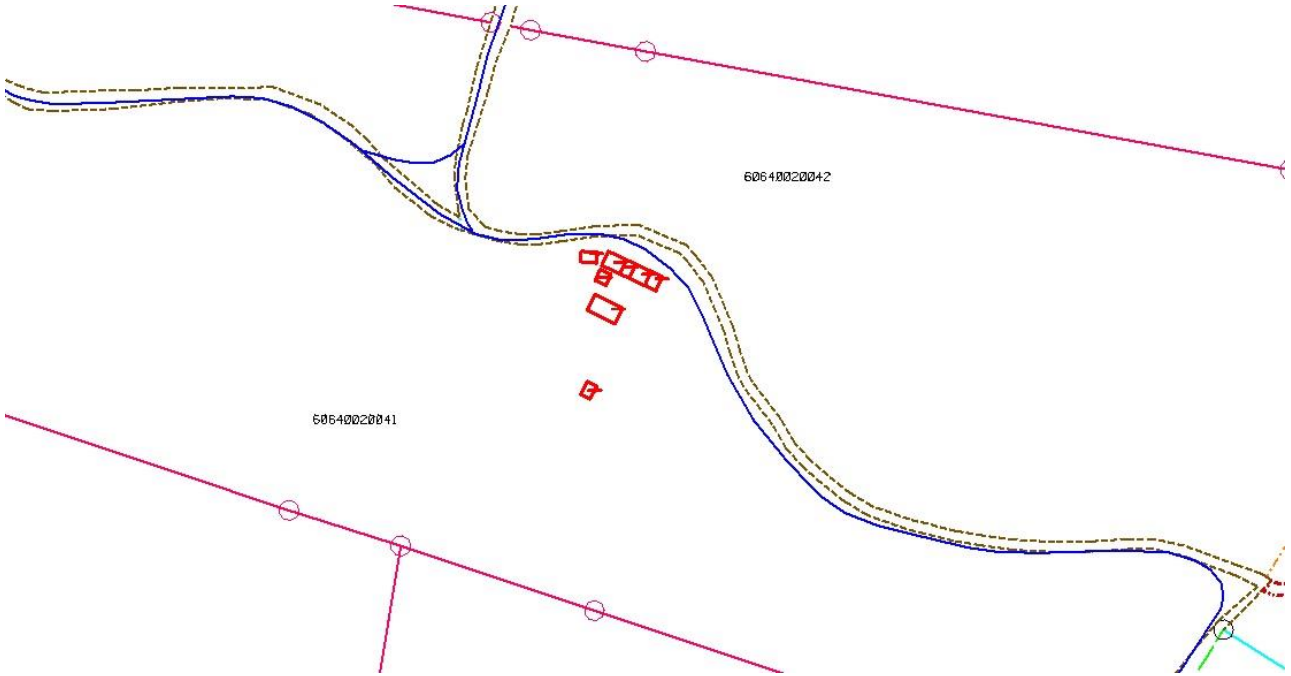
CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (8)

Exploration of the axis of the road



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CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (9)

Making a decision – update or not to update border of land parcel

Photoplan

Orthophotomap 2003-2005

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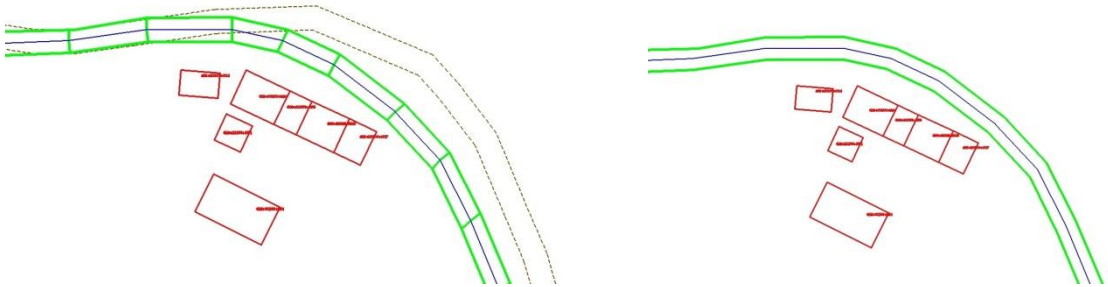
CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (10)

Border design according to delimitation acts and border plans on ortophotomap base



Orthophotomap 2013-2015

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CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (11)

Problem: the axis of the road in topographic map 1:10 000 does not coincide with the axis of the road visible orthophotomap

Orthophotomap 2013-2015

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CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (12)

Problem: It found that land parcels of land owners in the nature are different as are indicated from border plans of properties

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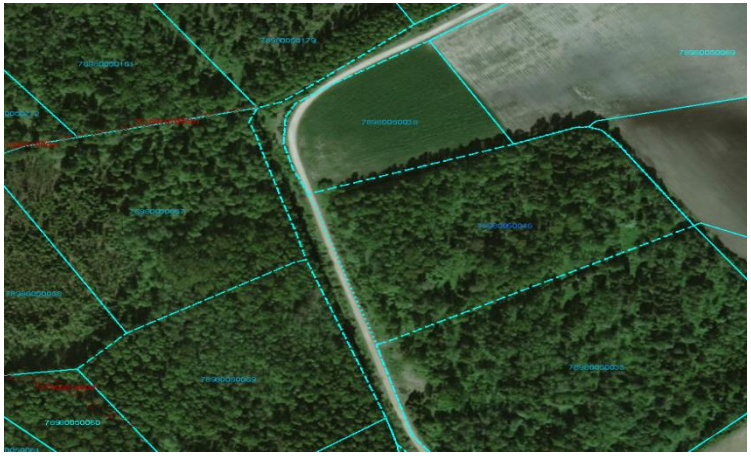
CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (13)

Question: How accurate data should be – m or to cm?

1:10 000

1:5000



1:2 000

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CONSISTENCY OF DATA BETWEEN CADASTRAL MAP AND ORTHOPHOTOMAP (14)

- The production process of ortophotomap is time-consuming, therefore ortophotomap in different territories of Latvia are of various age. Up to date ortophotomap are used for management of the Cadastral Map
- Buildings and servitude roads must be updated on ortophotomap at the same time!
- After receiving new ortophotomap all objects of Cadastral Map are occasionally reviewed

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Thank you for your attention!

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