

# APPROACHES OF CONSOLIDATION OF LAND PROPERTIES IN RURAL AREA OF LATVIA

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## Abstract

The article deals with land consolidation solutions in three rural territories of Latvia, creating perspective monolithic land plots in order to prevent land fragmentation and improve the structure of land properties. Although all three project territories are located in geographically analogical circumstances, established structure of land properties, their infrastructure and location in relation to Riga and other cities and towns prescribes different objectives of land consolidation. The proposed land consolidation methodology could be powerful tool in hands of local municipalities in order to promote development of rural area in general, agriculture and other sectors.

Key words: land consolidation, land fragmentation, monolithic land plot, structure of land properties, land parcel.

## Introduction

To create a legal basis for rational land use, sustainable development of the territory and land protection, balancing land use and land protection, as well as private and public interests in land use, in 2013 by Parliament of Latvia was approved 1<sup>st</sup> reading of Land Administration Law, where land consolidation is defined as one of measures of land administration. Land consolidation as powerful tool for rural development for many centuries is known in old Western European countries - Germany, Denmark, the Netherlands, Scandinavian countries and other parts of the world. Many of territory development activities in rural area of these countries are closely related to the solution of significant ownership problems and conflicts in land use. In many cases they are condemned to failure, especially if there is no land, or it is located not in the right place, or it is not available at appropriate area and shape. Solutions of transport infrastructure, surface water protection, development of biotope networks and tourism infrastructures, as well as development of rural environment and human settlements is not possible if is lack of the land for their arrangement. For this purpose it is necessary to find a property - friendly, socially sustainable and land - protective solutions (Leonhard, 2012). European spatial planning policy is no longer conceivable without land consolidation as a sustainable land use and rural development instrument. Current land consolidation in Western European countries has been used for more than 100 years. Accumulated experience can be useful for countries in transition, too, because for more than 50 years during soviet - agricultural collectivization period land consolidation was not essential. But since 1990 land consolidation again could be an important tool to improve the production conditions in agriculture and forestry, as well as to improve results of land reforms in these countries. Therefore, land consolidation again is in order of the day of many governments (Thomas, 2012; FAO, 2003; FAO, 2004; FAO, 2008). On issues of opportunities and objectives of land consolidation have been focused many of Western and Eastern European scientists (Thomas, 2012; Demetriou, 2014; Vitikainen, 2004; Maasikamae, 2005; Horjan, 2005; Pasakarnis, Maliene, 2008, etc.). Also, for the results to be achieved are many publications describing economic, social and environmental consequences of land consolidation. Although in general objectives and tasks of land consolidation in all countries are similar, each country has developed or is developing own land consolidation system, methods and procedure of its implementation. It may be based on historical experience, effects of land reform, structure of land properties and other conditions. Currently in Latvia is going on preparation to start this process. Comparing with neighboring country Lithuania, where due to methodological assistance of Danish colleagues and financial support of EU was implemented large number of land consolidation projects, in Latvia proposals of foreign experts to initiate land consolidation for solutions of land reform results problem did not have meet considerable attention. There can be variety of objective and subjective reasons – lack of normative base and financial resources, uncertainty about benefits of land consolidation, etc. Several Latvian authors have investigated theoretical issues of land consolidation, evaluating its preconditions, as well as offering solutions for land consolidation implementation (Platonova D., A. Jankava, 2011; Parsova V., Kapostins E., 2012). Necessity of land consolidation is required by inconvenient farm structure and land fragmentation, which leads to reduced efficiency of agricultural production and have a negative impact on the income of the rural population (Pasakarnis, Maliene, 2008). The number of land

properties in rural area of Latvia over the years is growing, but average area of the farms is decreasing (Table 1).

**Table 1**

Number and area of land properties (2001 - 2012)

Indicators	Units of measurements	Years		
		2001	2006	2012
Number of land properties according to their total area	thous.	251.3	269.3	313.8
Average of total area of land property	ha	14.5	15.1	12.3
Average of farmland of land property	ha	9.2	8.8	7.3

Source: author's calculation according to data of State Land Service

Data of Central Statistical Bureau show that in period 2001 - 2010 number of farms has decreased even for 54 % (from 180.3 thous. to 83.4 thous.), but their average area according to farmland area per farm has increased for 87 % (from 12.4 ha in 2001 to 23.2 ha 2010). Data show that farms still are small and fragmented.

Due to widespread fragmentation and growing importance of rural area for implementation of non-agricultural projects, land consolidation can be an important element in strategies and projects which are aimed to improve the quality of life in rural area through more efficient management of natural resources and environment protection, creating infrastructure and job opportunities, providing services and improving living conditions in rural area (The Design of ..., 2003). In this context, land consolidation can become an effective tool not only for land fragmentation problems, but also for sustainable rural development in a broader context.

Up to now land consolidation in Latvia is not putted into practice, although concept of land consolidation is defined in the Land Survey Law and established as one of the land survey activities. In the draft of Land Administration Law land consolidation is defined as *a set of measures which include rearrangement of land parcel boundaries and change of land ownership rights in order to improve use of the land*. Land consolidation should be carried out in the following cases:

- to improve the structure of farms;
- for rational use of natural resources;
- for improvement of infrastructure;
- for public needs;
- for elimination of inter-areas (Land management ...).

In framework of this article is presented a possible land consolidation solution in three local municipalities of Latvia: municipality territories Tervete, Iecava and Olaine. The land consolidation projects are planned as thematic spatial plans. According to the legislative acts thematic spatial plan is observed as one of the spatial planning documents, the main objective of which is to provide compliance of real properties to planned perspective land use (Teritorijas attīstības plānošanas..., 2011). It is envisaged that the land consolidation project for economic development of the municipality would be initiated by local municipality. It would be a basis for improvement of land property structure throughout the municipal territory or just in a part of municipal territory.

### Methodology of research and materials

This article offers proposals for solutions of land consolidation in three local municipality territories, using methodology of land consolidation in order to prevent fragmentation of the land, which is described by V.Parsova and E.Kapostins (Parsova V., Kapostins E., 2012). This methodology is based on the condition – if landowner owns several land parcels, which are included in one or several land properties, and these land parcels have no common boundary, should be featured (designed) so-called *monolithic land plots*, which can be divided into existing and perspective monolithic land plots.

*Existing monolithic land plot* is untendedly used territory, which is formed of one land parcel or set of several land parcels, which have common external boundary. All land parcels are adjacent to each other, or they are not adjacent to each other, if they are separated by municipal road. Existing monolithic land plot can consist of:

- land parcels owned by one person, but included in several land properties;
- co-owned land parcel, if any of co-owners in the some time is co-owner of the adjacent land parcel, which is included in other land property.

*Perspective monolithic land plot* is defined as land owned by person, together with additional territory owned by other persons and included in perspective land property. Perspective monolithic land plot may consist of several land parcels with different ownership rights. The goal of design of perspective monolithic land plots is to create a land plot with compact shape (configuration) and land area that would be suitable for use in compliance with planned perspective land use (Parsova V., Kapostins E., 2012). In land consolidation project are designed perspective monolithic land plots, but in some cases can be rearranged existing monolithic land plots, too.

Perspective monolithic land plot is designed within the frame of particular type of land use. All land parcels, included in perspective monolithic land plot according to the territory plans have to have the same intended use of the land.

For designing of perspective monolithic land plots are chosen territories as follows:

- which are characteristic by fragmented property structure – land parcels owned by the some person have no common boundaries;
- where existing property structure does not match with intended purpose of land use – territories are not suitable for use in compliance with planned perspective land use;
- further use of which could be affected by development and construction of new public infrastructure, planned by local municipality.

Development of land consolidation project and design of perspective monolithic land plots have to be done gradually, following to certain priorities. Perspective monolithic land plot can form territory which includes a number of land parcels, and each land parcel may be owned by different persons. Therefore each perspective monolithic land plot should have its subject. *Subject of perspective monolithic land plot* is owner of main land parcel included in perspective monolithic land plot.

As *main land parcel* is defined land parcel, where around is provided creation of perspective monolithic land plot. As main land parcel of built-up perspective monolithic land plot is defined land parcel, where are located constructions. Setting priorities and order in which perspective monolithic land plots are connected with subject of perspective monolithic land plot have to be distinguished between two types of perspective monolithic land plots – open and built-up monolithic land plots.

Designing *built-up monolithic land plot* the first priority is given to landowner who lives in a building on the land parcel and uses the land in compliance with planned perspective land use. Whereas the second priority is given to landowner who does not live in the building on the land parcel but uses the land in compliance with planned perspective land use. Priority always have to be given to the subject of perspective monolithic land plot who uses its land in compliance with planned perspective land use. In those cases perspective monolithic land plot have to be created next to the farmstead.

Designing *open monolithic land plots* the first priority again is given to landowners who use their land in compliance with planned perspective land use. As main land parcel of open monolithic land plot have to be chosen either the largest land parcel or land parcel for which are received EU support payments. At the same conditions priority have to be given to the person ownership rights of which is restituted, as well as to person, which receives EU support payments.

Designing perspective monolithic land plots in municipality territories Tervete, Iecava and Olaine were set up a condition that one landowner can have not more than three monolithic land plots. For development of land consolidation projects were used textual and spatial data (cadastre map) of Cadastre information system, as well as for better evaluation of the situation were applied data of Geospatial Information Agency - orthophoto maps. Some information, for example, information on leasehold was acquired from local municipalities.

## **Discussions and results**

All three municipality territories are located in the middle of Latvia, lowland of Zemgale, where the soil is suitable for agriculture (Fig. 1).



**Fig.1.** Disposition of municipality territories Olaine (1), Tervete (2) and Iecava (3) in Latvia.

However, situation in land use in each of them is different, which is affected by disposition of municipality territories in regard to capital of Latvia - Riga and other cities and towns, as well as by traffic lanes crossing mentioned territories. Different in all three municipality territories is proportion of farmland - in Tervete farmland makes up 71% of total area of municipality territory, but in Olaine - only 16% (Table 2).

Although the main condition of land consolidation in all municipality territories is the same – formation of perspective monolithic land plots, land consolidation solutions in each municipality territory is different because it is influenced by characteristic feature of each municipality from point of view of their disposition, area of farmland and developed property structure.

**Table 2**

Land area and its proportion in municipality territories Olaine, Tervete and Iecava on 01.01.2012

Category of types of land use	Municipality territories					
	Olaine		Iecava		Tervete	
	area, ha	% of total area	area, ha	% of total area	area, ha	% of total area
Farmland	4611.9	16	14210.3	46	6592.4	71
Forests	16056.4	55	13384.1	43	1885.3	20
Other	8452.8	29	3540.7	11	806.2	9
<b>Total area</b>	<b>29121.1</b>	<b>100.0</b>	<b>31135.1</b>	<b>100.0</b>	<b>9283.9</b>	<b>100.0</b>

Source: author's calculation according to data of State Land Service

*Municipality Olaine* has very advantageous geographic location. Olaine town together with rural area is located on the midway between Riga city (23 km) and Jelgava town (21 km). Territory consists of two geographically separate parts – main part around Olaine town and territory of summer cottage village Janupe, which have no common boundary. Municipality territory is crossed by transit and communication infrastructure, there is a well- developed road network, as well as railway. There are located build up territories – 47 gardening societies where buildings are used for permanent living, and 21 village. Often landowners are interested to subdivide their land mostly for construction of private residential houses. Such tendencies have been observed not only in populous areas but also in the rural area. Building mode in the villages is different. In villages located close to the auto road Riga – Jelgava is allowed to construct not only dwelling houses but commercial or mixed commercial and industrial buildings, too, mainly warehouses, distribution centres, etc. At the same time in Olaine direction is going on expansion of industrial zone of Riga. It is determined by advantages of geographic location of municipality Olaine – nearness to major transport roads, the Riga port, Riga airport and the centre of Riga city. Although farmland in municipality Olaine is relatively less than the other two municipalities, there are registered more than 450 farms with total land area about 3900 ha and more than 500 household plots with total land area 1700 ha (Olaines pagasta teritorijas..., 2008).

Before development of land consolidation project was analysed existing real property structure, existence, availability and location of infrastructure, natural and artificial barriers (roads, railways, rivers and other elements) which encumber management of properties. It was also existing property structure compared with planned (permitted) land use and assessed possible land use in future. After analysis it was determined that perspective monolithic land plots in municipality Olaine have to be formed for three objectives:

- development of agriculture;
- development of industrial zones;
- in some places for development of private residential houses.

Comprehensive assessment of ownership structure and possibilities to form monolithic land plots in land consolidation project have been included 278 land parcels owned by 136 landowners, including:

- 62 landowners who own several land parcels which are included in one or several real properties and are separated one of another (there are not formed monolithic land plots);
- 8 landowners who own several land parcels which are included in one or several real properties but are adjacent one to another (there are formed monolithic land plots);
- 66 landowners who own one land parcel, mostly it is unmanaged, abandoned land.

Area included in the project is 1993 ha - 34% of agricultural land in municipality Olaine.

*Municipality Iecava* is located in central part of Latvia, its administrative center is located 45 km from Riga city, 30 km from Jelgava town and 21 km from Bauska town. Municipality territory is crossed by dense and well- developed road network – from the north to south it is crossed by auto road Riga - Bauska, which is section of international highway Via Baltica. There are located well- developed water supply, sewerage and wastewater treatment systems, as well as number of gas pipelines of international and national importance. The most developed sectors are agriculture and related to it industrial production, processing of agricultural products, forest exploitation and processing of timber. Main sector of agriculture is crop production, not a lot – cattle breeding, but also are developed other specific sectors - beekeeping, horse breeding, gardening, as well as non-traditional agriculture – breeding of ornamental birds, rabbits, deers, etc. Overall, in the municipality are registered 260 farms. In land consolidation project were included 530 land parcels owned by 216 landowners, area included in the project is 4560 ha or 23% of agricultural land in municipality Olaine. 53.7% of the landowners have the land area of which is less than 10 ha, but its total land area is only 11% (Table 3).

**Table 3**

Breakdown of land properties and intervals of land area included in the land consolidation project in Iecava municipality

Interval of land area, ha	Land properties		Total area	
	number	%	ha	%
0-5	67	31.0	156.2	3.4
5-10	49	22.7	347.8	7.6
10-25	63	29.1	1026.2	22.5
25-50	16	7.4	528.4	11.6
50-100	13	6.0	929.1	20.4
100-200	4	1.9	502.6	11.0
200-400	4	1.9	1069.8	23.5
<b>Total</b>	<b>216</b>	<b>100.0</b>	<b>4559.8</b>	<b>100.0</b>

Source: author's calculation according to data of State Land Service

The data in Table 3 show that in Iecava municipality there are a lot of small land properties and property structure is relatively fragmented.

Territory of *municipality Tervete* has very favourable conditions for agricultural production. Implementing drainage on 90 % of total area of farmland have been established not only proper moisture regime of the soil, but also created fields of large area with good technological qualities, furthermore length of cultivation belt is 1000 m and more. The land is well cultivated and crop productivity is highest in Zemgale lowland but production cost per production unit is lowest in the country. Really all farmland is under production, main type of land use is crop production. Municipality Tervete differs from other two municipalities with the fact that the land is managed by several large agricultural companies. The largest of them is joint-stock company “Agrofirma Tervete”,

which manages about 3000 ha of land, 2/3 of which has ownership status but the rest is leasehold land. There are two agricultural companies, each of them is managing more than 1000 ha, but most area of the land is leasehold land. Besides there are several farms, which are managing about 100 ha. As the biggest problem farmers distinguish fragmentation of farmland which makes agricultural production more difficult and inefficient.

In land consolidation project were included 153 land parcels with total area 2000 ha owned by 9 landowners. Since there are located large agricultural companies, in frame of the project was also taken into account land of leasehold, too, which makes considerable part of the managed area. Agreement on leasehold usually is sign for long term (more than 5 years, in some cases over 15 years), therefore land of leasehold can be included in land consolidation project. Thus, total area of land consolidation project in Tervete municipality was 3458 ha consisting of 57 existing monolithic land plots (Table 4).

**Table 4**

Number of land properties, included in land consolidation project in Tervete municipality

Number of property	Owned land parcels		Leased land parcels		Total area, ha	Number of monolithic land plots
	number	area, ha	number	area, ha		
1	11	75.4	3	39.5	114.9	7
2	3	10.6	-	-	10.6	3
3	4	61.9	-	-	61.9	4
4	7	66.0	-	-	66.0	3
5	3	61.0	-	-	61.0	2
6	87	1275.9	26	612.5	1888.4	19
7	7	164.3	13	300.5	464.8	4
8	5	83.1	-	-	83.1	4
9	26	203.8	20	503.1	706.9	11
<b>Total</b>	<b>153</b>	<b>2002.0</b>	<b>59</b>	<b>1455.6</b>	<b>3457.6</b>	<b>57</b>

*Source: author's calculation according to data of State Land Service*

Surveying the territory included in land consolidation project and evaluating structure of existing land properties, is established a fact that land of agricultural enterprises, especially of largest, consist of several land parcels which are mutually distant, with inconvenient external boundaries, as well as disadvantageous shape for mechanised machining. Land fragmentation encumbrances agricultural production and landowners are not interested to cultivate all owned land therefore part of it remain unmanaged. Position of authors is that for best land management to one landowner has to be formed not more than 2 - 3 monolithic land plots.

Based on the methodology (Parsova, Kapostins, 2012), perspective monolithic land plots in all three municipalities were formed gradually, step by step. In beginning was chosen main land parcel as the basis for formation of monolithic land plot, after were determined external boundaries of monolithic land plots including necessary land parcels. External boundaries were determined taking into account existing in the field infrastructure (roads, buildings, etc.), location of drainage systems and other natural elements. There was observed the initial requirement - to one landowner to form not more than 3 monolithic land plots.

Forming monolithic land plots by exchange of land parcels or their parts was achieved relatively good results. In Olaine municipality to 128 landowners the land was formed in one monolithic land plot and to 8 landowners – in two monolithic land plots. In Iecava municipality carrying out land consolidation process was almost doubled (for 88%) number of land properties which are included in one monolithic land plot. Only 16 land properties, instead of former 80, are included in two monolithic land plots and only 6 land properties - in three monolithic land plots. Also in Tervete municipality instead of 57 existing monolithic land plots were formed 15 monolithic land plots, int.al. to 6 landowners the land was formed just in one monolithic land plot (Table 5).

**Table 5**

Number of monolithic land plots in Olaine, Tervete and Iecava municipality before and after land consolidation

Number of monolithic land plots	Number of land properties in land consolidation project					
	Olaine municipality		Iecava municipality		Tervete municipality	
	before	after	before	after	before	after
1	74	128	103	194	-	6
2	47	8	80	16	1	-
3	8	-	16	6	2	3
4	3	-	7	-	3	-
5	2	-	1	-	-	-
6-10	1	-	5	-	1	-
10-20	-	-	3	-	2	-
>20	-	-	1	-	-	-
<b>Total</b>	<b>136</b>	<b>136</b>	<b>216</b>	<b>216</b>	<b>9</b>	<b>9</b>

Source: author's calculation according to data of State Land Service

### Conclusions and proposals

1. Assessing results of land consolidation in aspect of formation of monolithic land plots in Olaine, Tervete and Iecava municipality can be concluded that such project can facilitate development of local municipality and use of land in accordance with planned purpose of use.
2. Land consolidation projects can be developed for needs of different purposes taking into account existing situation, structure of established land properties and agriculture enterprises, as well as other conditions.
3. In order to carry out land consolidation it is necessary to evaluate structure of existing land properties and determine need for land consolidation in order to solve imperfections of their territorial location.
4. Land consolidation, promoting development of territory of local municipality and agricultural sector, have to be included in spatial planning process in order to improve the structure of land properties.
5. In order to facilitate the effective and efficient use of land local municipality having determinant role in spatial planning have to be involved in land consolidation process.

### References

10. Demetriou D. (2014) *The Development of an Integrated Planning and Decision Support System (IPDSS) for Land Consolidation*: Doctoral Thesis accepted by the University of Leeds, UK. Springer International Publishing Switzerland. 340 pp.
11. FAO (2003) *The design of land consolidation pilot projects in Central and Eastern Europe*. FAO Land Tenures Studies, No. 6. Food and Agriculture Organization of the United Nations, Rome. 55 p.
12. FAO (2004) *Operations manual for land consolidation projects in Central and Eastern Europe*. FAO Land Tenure Manuals. Food and Agriculture Organization of the United Nations, Rome. 69 p.
13. FAO (2008) *Opportunities to mainstream land consolidation in rural development programmes of European Union*. FAO Land Tenure Policy Series, 2. Food and Agriculture Organization of the United Nations, Rome. 72 p.
14. Horjan O. (2005) *Konsolidacija zemelj – kljucevejaja problema ustojchivogo razvitija seljskogo hozjaistva*. In: Baltic Surveying`05: International Scientific Methodical Conference, the 12-13 May, Proceedings. Jelgava: LUA, 43-49 pp.
15. Leonhard R. (2012) *Processe und Instrumente der Dorfentwicklung*. In: Kummer K./ Frankenberger J.(Hrsg.) *Das deutsche Vermessungs- und Geoinformationswesen 2013*. Berlin: Wichmann, S. 261-295.
16. Likumprojekts *Zemes pārvaldības likums*: LR Ministru kabineta mājaslapa. Viewed 18 February, 2014 (<http://www.mk.gov.lv/lv/mk/tap/?pid=40224010>).
17. Maasikamae S. (2005) Assessment of Land Fragmentation. In: VAGOS: research papers 67 (20), 1, LUA, p. 75-82.
18. Olaines pagasta teritorijas plānojums (2008). Paskaidrojuma raksts – Gala redakcija: Olaines novada mājas lapa. Viewed 22 February, 2014 ([http://www.olaine.lv/uploads/filedir/Images/Attistiba/Teritorijas\\_planosana/Pagasts/olaine\\_pr\\_gr.pdf](http://www.olaine.lv/uploads/filedir/Images/Attistiba/Teritorijas_planosana/Pagasts/olaine_pr_gr.pdf)).
19. Parsova V., Kapostins E. (2012) *Does land consolidation fit everywhere?* In: Proceedings of FIG Working Week 2012: Territory, environment, and cultural heritage, Rome, p.11. Viewed 21 February, 2014 ([http://www.fig.net/pub/fig2012/papers/ts02e/TS02E\\_parsova\\_kapostins\\_5795.pdf](http://www.fig.net/pub/fig2012/papers/ts02e/TS02E_parsova_kapostins_5795.pdf))

20. Pasakarnis G., Maliene V. (2008) *Land consolidation: an Essential tool for Sustainable Rural Development*. In: Conference on the Built Environment and natural Environment. Liverpool, p. 50-56. Viewed 18 February, 2014 ([https://search.livjm.ac.uk/BLT/BUE\\_Docs/BEAN\\_proceedings\\_2008.pdf#page=50](https://search.livjm.ac.uk/BLT/BUE_Docs/BEAN_proceedings_2008.pdf#page=50))
21. Platonova D., Jankava A. (2011) *Research of the preconditions of land consolidation in rural districts*. In: Economic Science for Rural Development: Proceedings of the International Scientific Conference. Jelgava: LLU, p. 174-181.
22. Teritorijas attīstības plānošanas likums (2011): LR likums. Viewed 20 February, 2014 (<http://www.likumi.lv/doc.php?id=238807>).
23. Thomas J.(2012) *Verfahrensablauf der Flurbereinigung*. In: Kummer K./ Frankenberger J.(Hrsg.) *Das deutsche Vermessungs- und Geoinformationswesen 2013*. Berlin: Wichmann, S.437-521.
24. Vitikainen A. (2004) *An Overview of Land Consolidation in Europe*. In: Nordic Journal of Surveying and Real Estate Research, Vol 1, No 1. Helsinki, The Finish Society of Surveying Sciences, 25-44 pp.

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