

Integrated Land Development in Finland – Land Consolidation and Improving Traffic Safety as a Case

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Key words: Land Consolidation, Traffic safety.

SUMMARY

Land Consolidation activities in Finland can be divided into three main categories: Land Consolidation of Arable Land, Forest Land Consolidation and Project Land Consolidation. At present the main focus is on Land Consolidation of arable land. There are historical reasons for this. Finnish agriculture has undergone many land reforms, whereof two were executed in the 19th century. Both of them scattered the farms. After a bloody civil war in 1918-1919 land leasers were liberated and new farms were established. New farms were also established after the Second World War for Karelian refugees and veterans of war. Such reforms affect the structure of the farms – the size of the farms and arable areas are smaller compared with our neighbouring countries.

Structural development of Finnish agriculture has been very harsh. In 1998-2008 approximately 26 000 farms disappeared from Finland. Currently the total number of farms in our country is less than 67 000. The same amount of arable land is still in use. Although the size of the farms has increased, the arable areas have often remained very small. The growth of farms is based on small parcels, which are often located at a considerable distance. The growth of farms continues. Land Consolidation of arable land enables to gather the scattered areas and to use modern technology. Such a procedure often speeds up the structural development of farms in the villages. It is possible to combine the growth of farms with the improvements of arable areas.

Land Consolidation also allows improving traffic safety. Agricultural criss-cross driving on highways can be reduced. Very often arable land areas can be consolidated in such a way that farmers no longer have to drive to their parcels through the highway. Dangerous agricultural junctions can be demolished. The situation is similar on the railways. Dangerous railway level crossings can be removed because they are no longer needed.

An important part of Finnish Land Consolidation is land banking. Currently land banking is implemented in ad hoc ways. However, in several Land Consolidation projects the land bank is used successfully. Land banking makes it so much easier to carry out considerable changes in the use of land. Since the result is often much better for the landowner, a real Win-win situation can be created.

TIIVISTELMÄ

Tilusjärjestelytoiminta Suomessa voidaan jakaa kolmeen erilaiseen ryhmään: Pelto-, metsä-, ja hanketilusjärjestelyihin. Tähän on olemassa historialliset syyt. Suomalainen maatalous on kokenut useita maareformeja, joista kaksi suoritettiin 1900 –luvulla. Kummatkin näistä pirstoivat peltoja. Verisen sisällissodan jälkeen 1918 torpparit vapautettiin ja heille perustettiin uusia maatiloja. Myös toisen maailmansodan jälkeen perustettiin uudistiloja karjalan evakoille ja rintamamiehille. Tällaiset reformit vaikuttivat maatilojen rakenteeseen – maatilojen ja peltolohkojen koko on pienempi kuin naapurimailla.

Maatalouden rakennemuutos Suomessa on ollut rajua. Vuosien 1998 ja 2008 Suomesta hävisi 26 000 maatilaa. Tällä hetkellä maatilojen lukumäärä on alle 67 000. Sama määrä peltoa on kuitenkin viljelyksessä kuin aikaisemminkin. Vaikka maatilojen koko on kasvanut peltolohkojen koko on usein pysynyt pienenä. Maatilojen kasvu on perustunut pienten usein kaukana sijaitsevien peltolohkojen hankintaan.. Tilojen kasvu jatkuu edelleen. Peltotilusjärjestely avulaon mahdollista koota pieniä peltolohkoja suuremmiksi kokonaisuuksiksi. Tämä mahdollistaa nykyaikaisten viljelytekniikoiden käyttöönoton. Peltotilusjärjestely myös nopeuttaa maatalouden rakennemuutosta kohdealueellaan. On mahdollista yhdistää peltolohkojen ja maatilojen kasvu.

Tilusjärjestelyn avula on myös mahdollista parantaa liikenneturvallisuutta. Traktoreiden ristiinkulkua voidaan vähentää tilusjärjestelyllä. Usein pellot voidaan järjestellä siten, että maanviljelijöiden ei tarvitse enää ajaa lohkoille maantien kautta. Vaaralliset maatalousliittymät voidaan poistaa. Rautateillä tilanne on samanlainen. Vaaralliset rautatien tasoristeykset voidaan tilusjärjestelyn jälkeen tarpeettomana poistaa.

Tärkeä osa suomalaista tilusjärjestelyä on maapankkitoiminta. Tällä hetkellä maapankkitoimintaa harjoitetaan Suomessa improvisoiduin keinoin. Kuitenkin useissa tilusjärjestelyhankkeissa on maapankki toiminut onnistuneesti. Maapankki helpottaa tilusjärjestelyn toteuttamista merkittävästi. Koska lopputulos on useimmiten paljon parempi maanomistajalle, syntyy todellinen win-win tilanne.

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1. THE FINNISH REAL ESTATE SYSTEM – BACKGROUND

1.1 Basic Land Consolidations

Basic Land Consolidations (e.g. Finnish: Isojako, Swedish: Storskifte) have created the Foundation of the Finnish real estate system. The Swedish parliament (Finland was a part of Sweden until 1809) passed the Basic Land Consolidation Act in 1757. The main objective of the Act was to abolish the previously applied open field system. Before the Basic Land Consolidation fields had been divided into narrow strips. Such a division was made using a type of measurement pole. All fields in the village were divided into narrow strips using the pole and in turn each house in the village was provided with a share. Farming of such narrow strips required co-operation of all villagers. In practice this meant that work proceeded according to the slowest worker and improvements were not made until each villager had given his approval. Or at least this was what the makers of the Basic Land Consolidation Act believed. One could argue that before the Basic Land Consolidation some kind of collectives existed and that the aim of the Act was to abolish these, but of course this was not the case.

First Basic Land Consolidations were introduced rapidly and the first attempt to start Basic Land Consolidation in Finland was made in Laihia, in Ostrobothnia as early as 1757. However, the project confronted wide resistance. The local head of the rural police announced that the surveyor could not be provided with a bedside or any help to carry out the Consolidation. Vicar Samuel Wacklin wrote a letter to the governor in which he demanded to stop such an impossible, unreasonable and immoral undertaking. However, the officials of the crown were determined. A fine was imposed on the vicar, who was also unseated from his position for a year. The decisiveness of the officials was victorious. The Laihia Basic Land Consolidation was completed in 1765.

As the Basic Land Consolidation Act arrived in Finland, the small group of Finnish land surveyors was in Ostrobothnia carrying out taxation surveys and therefore the first Basic Land Consolidations were completed in Ostrobothnia. The small number of surveyors slowed down the advance of Consolidations. In 1750 the number of surveyors in Finland reached 30, who mainly carried out taxation and geographical surveys. When the Consolidation Act was passed this group was transferred to conduct Basic Land Consolidations. Since the Consolidations faced wide resistance from local officials and farmers, the surveyors often had to yield to local interest groups and the Consolidations were carried out with minor changes compared to the previous situation. This was particularly true in western and southern parts of Finland. However, for the first time proper maps of farms were drawn up.

When the Russian Tsar Alexander I occupied Finland in 1809, Finland was incorporated in the Russian Empire and Alexander I became Grand Duke of Finland. The transfer to be part of the Russian Empire did not change the land system. Former Swedish laws remained effective, sometimes even for a longer time than in the mother country. Basic Land Consolidations were continued. In western and southern parts of Finland Consolidations were completed and the focus was gradually put on eastern Finland. The nature and wildlife is quite different in western and eastern Finland. Western Finland is an area filled with large fields and rivers, whereas lakes and forests, and small fields separated from one another between them, cover eastern Finland. Partly owing to the nature and partly to the Consolidations being carried out later, the Basic Land Consolidations in eastern Finland were more successful than those in western Finland. Compared with western Finland, rearrangements have not been required widely in eastern Finland.

The Act on Land Survey Administration passed as early as 1848 initiated the completion of early Basic Land Consolidations using rearrangements particularly in western and southern Finland. Between the years 1848 and 1918 1,5 million hectares of land were subjected to such rearrangements in Finland. When you consider that in 2002 the amount of agricultural land is 2,2 million hectares in Finland, the amount of land that was rearranged is huge, even though the number includes forests and plots of land.

In the Dividing Act of year 1916 the term Rearrangement of Basic Land Consolidation was changed into Land Consolidation (in Finnish: *uusjako*, literally *New Division*). Still the focus of Consolidations remained in western and southern Finland. In total 0,89 million hectares of land was consolidated between the years 1916 and 1980. After 1960 the Land Consolidations were concentrated to Ostrobothnia. Operation was insignificant in other parts of Finland. In the 21st century Finland, land surveyors were occupied with other challenges.

1.2 Land Reforms

At the end of the 19th century new and old European ideas arrived in Finland. Nationalism and socialism emerged in the north. The first Finnish novel, *Seven brothers* by Aleksis Kivi, was written in 1870. Dreams of an independent Finnish State showed signs. Industrialization came to Finland. The first factory in Europe to use electrical light in 1882 was Finlayson in Tampere. With industrialization socialism arrived in Finland. In addition to the improvement of the conditions of factory workers the crofter problem became a major political issue in the early 20th century. Especially in southwest Finland the number of crofters, i.e. farmers who leased their land was increasing. Crofters often depended on the goodwill of the landowners and were faced with the possibility of eviction. In those days strikes and evictions got a lot of attention; one of the most famous crofter incident took place at Laukko mansion in Vesilahti municipality in 1907. Crofters of the Laukko mansion were striking for better leasing conditions but the landowner, baron Herman Standerstskjöld-Nordestam, evicted the striking crofters. More than 500 people lost their homes in the cold winter. This happened just before the first general elections in Finland. Many political parties sympathized with the crofters, but the social democratic party was the only one to support a total liberation of crofters.

However, much to the surprise of everyone the social democratic party won 80 seats of 200 in the elections.

Even though the crofters had a strong representation in parliament the crofter problem could not be solved before the First World War. Strikes and confrontations between crofters and landowners continued and culminated in the summer of 1917. The downfall of the Russian Tsar in February 1917 also caused restlessness in Finland. In January 1918 a bloody civil war broke out between whites and reds in Finland just as the Crofters Liberation Act was under parliamentary scrutiny. Although both sides had followers from all social classes the crofters mainly supported the reds. The strongest red supporting area was southwest Finland; a part of the country with a lot of crofters. At the end of January the red side introduced the Crofters Liberation Act, but after the loss of the reds in spring, this Act became irrelevant. Also on the white side the crofter question was considered to be so important that the Crofters Liberation Act that had been prepared was passed in parliament already in the summer of 1918. This Act was supplemented in 1919 to concern whole farm leasers, in 1921 church leasers and in 1922 crofters of the crown. According to the Act crofters were able to claim the leased lands for compensation and to gain possession of the lands. Between the years 1919 and 1940 a total of 92 000 new farms were formed including one million hectares of land. A simple calculation shows that the average size of such farms was 10,8 hectares.

Just as the crofter question was solved the surveyors faced a new challenge. In the Winter War 1939-40 and the Continuation War 1941-44 Finland lost most of the Karelian province to the Soviet Union. The inhabitants of these areas were evacuated to Finland. In all 410 000 people were looking for new home. The political will to settle the evacuees was strong and the Rapid Settlement Act 1940 and the Land Acquisition Act 1945 provided the means to start conducting surveys for settlements. During the war and immediately thereafter over 140 000 farms were formed for Karelians and war veterans and 2,7 million hectares of land changed ownership. Lands were acquired from the state, church, corporations and larger private farms. The size of these new farms was limited in the legislation, as the largest farm size allowed was only 15 hectares of land.

In consequence of these two major land reforms Finnish agriculture became dependent on small family farms. The entire structure of parcels, drainage and roads is based on small farms. Such a structure is still dominant in most Finnish rural areas. In the new millennium, this presents a real difficult challenge for the Finnish agriculture.

2. FINNISH LAND CONSOLIDATION - PRESENT

2.1 Agricultural Land Consolidations

Since Finland joined the European Union in 1995 the structural development of Finnish farms has accelerated. The average size of Finnish farms has grown rapidly. In 2007 the average farm size was 34,4 hectares compared with 25,8 hectares in 1995. Last year the total number of farms in Finland was 66 938. For the historic reasons mentioned above the division of fields in Finland is very scattered. Although the farm size has increased, the parcel size has

not. In several municipalities the average parcel size has been reduced but at the same time the farm size has increased. When parcels are sold the fields seldom end up with the neighbouring farmer but with the one who has the largest amount of money. Thus the parcel size remains small and the benefits of structural development are not met.

In the Finnish Agricultural Land Consolidation parcels at a target area are arranged to be as large as possible and if possible close to a homestead. In Finland it is rather drainage than irrigation that causes problems to cultivation. Therefore large drainage projects are often carried out with Land Consolidations. Also transfers of agricultural roads are common. Especially in western Finland farmers have perceived that Land Consolidation can be used as a tool for increasing and shaping parcels. In Finland the average parcel size has at times doubled or even tripled in project areas where Land Consolidation is applied. Also the support from Finnish government encourages farmers to employ Land Consolidation.

Agricultural Land Consolidations are the backbone of Land Consolidation activities in Finland. The projects are concentrated in western Finland, where 57 Agricultural Land Consolidations are currently in progress and the implementation of almost the same amount of projects (44) is currently under assessment. The average size of these projects is 1000 hectares. In central and eastern Finland four smaller projects are in progress. At present agriculture is becoming more like an entrepreneurship, which means that young farmers are searching for all kinds of means to improve economically viable farming. One possible solution is Agricultural Land Consolidation.

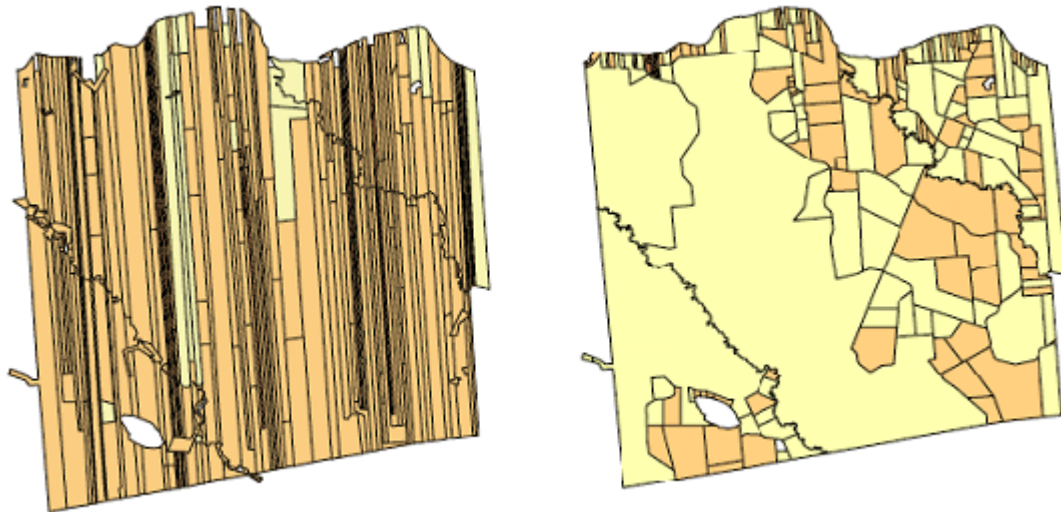
In Agricultural Land Consolidation contradictory interests have to be faced for instance towards nature preservation. Drainage works carried out in connection with Land Consolidations often abolish the green heavens for different kind of animal species and vegetation. Thus Land Consolidation destroys the diversity of nature. However, Land Consolidation decreases tractor traffic in the project area and thus reduces greenhouse gas emissions. The same works also clear the water flowing from the fields towards the water system and eventually to the Baltic Sea. The same project thus destroys species and helps to save the Baltic Sea! It is possible to consider all contradictory interest better in future Land Consolidations. You could for example establish green heavens for endangered species to protect the diversity of nature in connection with Land Consolidation.

2.2 Forest Land Consolidations

Although the focus of Land Consolidations in Finland is placed on agriculture, Forest Land Consolidations have also been carried out for as long as there has been Land Consolidations in Finland. The oldest Land Consolidations were carried out using an "overall" mentality. The projects therefore also included the forests of the village. At present Forest Land Consolidations are mainly being implemented in the Province of North-Ostrobothnia. A couple of projects are in progress in the region of Oulu.

Profitability of the project has become a main problem of Forest Land Consolidation. In order to obtain advantages of Forest Land Consolidation the project area needs to be large enough.

A large Finnish forest area includes forests of very different ages. Since most of the advantages of Forest Land Consolidation cannot be achieved before the trees have been cut down, the harvested areas present a problem. Why would anyone invest in Forest Land Consolidation if the benefits were achieved after 80 years? Who would wait for such a long time? In Finland Forest Land Consolidations are concentrated in areas, where the structure of parcels is so poor that the forests are not economically used.



The maps show the effects of Forest Land Consolidation implemented in the municipality of Ii, in the Pahkakoski area. The figure on the left shows the situation before and on the right the situation after Land Consolidation.

The recent Russian limitations of wood export present a challenge for the Finnish forest industry. In the last few years a considerable amount of raw material for the Finnish forest industry has been exported from Russia. The Russian government presumes that the forest companies invest in factories within the Russian borders. Currently the need for wood in Finnish paper and lumber factories is significant. In Finland forest ownership is often scattered into very small pieces of land owing to the historical reasons mentioned above. Many forest owners live in cities. Measures that could assure the supply of wood for factories include Forest Land Consolidation and establishment of Common forests. These improvements have already initiated a couple of development projects, but larger projects are still carried out only in the region of Oulu.

2.3 Project Land Consolidation

Finnish legislation enables Land Consolidations to be carried out in connection with land usage projects. This means that land consolidation is conducted in order to implement a land usage project or to reduce the side effects of the project. Such projects are commonly carried out for public interest. The most popular example of Project Land Consolidations is Land Consolidations for implementing nature reserves. Project Land Consolidations have especially

been carried out for implementing Natura – networks. By the end of year 2007 about 12 200 hectares of nature reserves had been established within 100 different projects.

Project Land Consolidation has also been used for reducing disadvantages of a new road, which is being built in a field area. Land Consolidation allows providing farmers, who have lost their fields under the new road, with new fields. Parcels can also be situated so that all unnecessary movement of tractors on the new road is minimized. In such a project the difference between Agricultural and Project Land Consolidation is vague. Similar procedures are carried out in both consolidations, but who pays for the project finally determines which type of project is concerned. When a farmer applies for Land Consolidation then an Agricultural Land Consolidation is concerned and those who pay for the project are the Ministry of Agriculture and Forestry and the farmers. When a realizer of land use (for example the Road Administration) applies for Land Consolidation then a Project Land Consolidation is concerned and the land usage realizer is principally responsible for the costs. The combination of both Land Consolidation types could create new possibilities.

3. IMPROVING TRAFFIC SAFETY WITH LAND CONSOLIDATION

3.1 Roads

In Finland the most fatal accident type on highways is head to head collisions, in which two cars moving in opposite directions collide. For example in 2004 the total number of lost lives in head to head collisions was 130. The Finnish Road Administration has tackled this problem with determination. Several large projects to build middle railing on highways have been initiated on Finnish main roads. Such projects present a challenge to the surrounding land usage. Direct junctions to roads with middle railing are generally not allowed. It is obvious that each parcel cannot be provided with multi-level junctions.

Land Consolidation allows minimizing the disadvantages of middle railing to surrounding land usage. Field parcels can be shifted to the side of the homestead. Thus building of circuitous routes and compensations paid by society can be avoided. The National Land Survey of Finland has developed what is known as the KIVA-procedure - Assessment of the effects of real estates (in Finnish: kiinteistövaikutusten arviointi). The KIVA –procedure has been created to help public road planning in rural areas. The procedure enables to assess all the effects, disadvantages, advantages on the real estates in the area and the best means to avoid disadvantages. Land Consolidations and private road arrangements are some of the means used to avoid disadvantages.

The heavy tractor traffic is also a safety risk on the highways. As the size of farms increases the farmers have to purchase new land further and further away from the homesteads. Consequently farmers spend more and more time on the roads. The National Land Survey has provided means to illustrate tractor movement on the roads. The RIKU –project was created for this purpose that employs a combination of the topographic database and the IACS – information system of the agricultural administration. By combining the data you are able to define the farmers' routes to the specific parcels, the length of the route and even the time if

you use the road categories accordingly. This system allows you to determine the weak points of the tractor traffic network and to help you with road planning. At the same time the system makes it possible to calculate tractor traffic in several municipalities that may include 10 000 to 20 000 hectares of fields.

The longest trips to parcels are the most difficult ones to remove using traditional Agricultural Land Consolidation. To maintain projects within manageable limits they are typically restricted to about 1000 hectares. In general this means an area, which is 2-3 km wide. Understandably farming distances that exceed 6 km cannot be removed using this kind of projects. In connection with each Agricultural Land Consolidation the tractor traffic should be assessed at a 10 km range from the original Land Consolidation area. It should be possible to include separate parcels, which are located far apart, in the project, if unnecessary tractor traffic could be limited. The Finnish Agricultural Land Consolidation still has room for improvement.

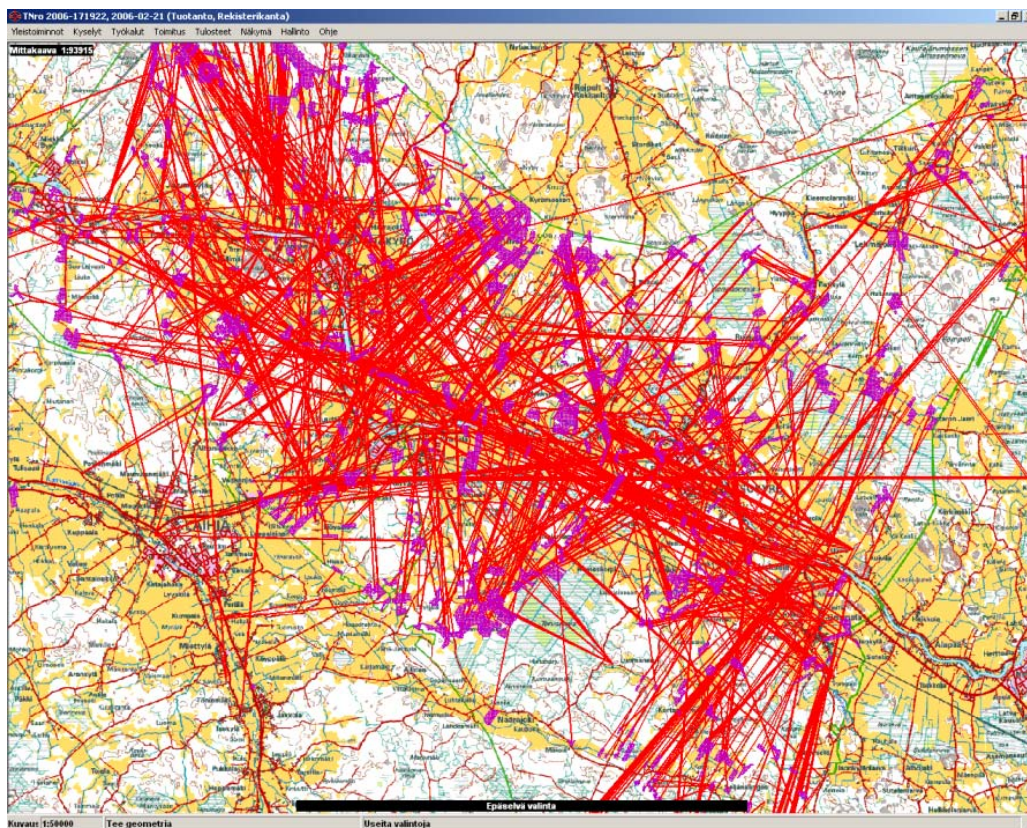


Figure shows the amount of tractor traffic in the municipalities of Isokyrö and Vähäkyrö in Ostrobothnia. Each red line represents a farmer's trip from his house to the parcel. Here only trips longer than 6 km are shown.

3.2 Railroads

The Finnish railroad network was built at the end of the 19th century during the golden age of steam locomotives. Railroads often followed straight lines and were built over agricultural areas. The number of level crossings remained high. Everybody had to have access to his or her parcels. During the age of steam locomotives this wasn't a safety problem, since the train speed seldom exceeded 60 km/h. Therefore the crossings didn't pose a real safety problem. All this changed in the 1960's when train speeds started to rise.

In the beginning of the new millennium the train speeds often exceeded 100 km/h. Nowadays the level crossings create a significant safety problem. Between the years 2000 and 2006, 53 lives were lost in railroad crossing accidents. For safety, train speeds are reduced below the technical maximum speed on railway sections provided with a vast number of level crossings. Slow speeds reduce the ability to compete with road transport. Private cars very often replace trains and passenger traffic gradually transfers to the dangerous and more polluting vehicle.

The Finnish Rail Administration has rapidly started to reduce the number of railroad crossings. Most commonly the abolishment of a single railroad crossing is carried out in a private road survey. You are either able to establish or abolish private roads and to apply for compensation. Land Consolidation provides new possibilities. In addition to roads you can also arrange parcels in Land Consolidation proceedings.

The abolishments of railroad crossings often create resistance in farmers. Very often their distances to their parcels increase. It is also possible that the abolishment of crossing transfers the farmer's route, who now has to use the highway. Thus such a removal of a railroad crossing may increase the safety of the railroad but decrease the safety of the highway. By extending the survey area to the vicinity of the railroad, a procedure can usually be found that is acceptable for the farmers, the Railroad Administration and the Road Administration. Combining the interests of all different parties is the most challenging task that a land consolidation surveyor can face.

A Land Consolidation procedure has currently reached its final stage in the city of Kokemäki in Järilä village, where level crossings and agricultural junctions were abolished in connection with an Agricultural Land Consolidation. Those responsible for the expenses of this project include the Ministry of Agriculture and Forestry, the Road Administration, the Railway Administration and individual farmers as well. In total the Land Consolidation area incorporates 820 hectares of land, whereof 720 hectares is fields. The farmers applied for a much larger area than the one originally planned for removing railroad crossings. The larger area provided a better result, than if only a small area around the railway had been surveyed. At the same time the average parcel size was increased from 2,5 hectares to 6,0 hectares.



An example presents the effects of the abolishment of railway crossings in the Land Consolidation procedure in the city of Kokemäki. The figures show a single farm. On the left the situation before and on the right after Land Consolidation. Abolished railway crossings are denoted with signs X.

3.3. Development of Land Consolidations in Finland

Land Banking is required for carrying out effective Land Consolidation activities. A land reserve is acquired and placed in a Land Bank for future usage in various projects. Land reserves are required for example to implement nature reserves, motorways and Agricultural Land Consolidations. When Agricultural Land Consolidation is carried out the land acquired is transferred to farmers as additional land. Land reserves allow you to increase parcels extensively. In the 90's the minister responsible for Land Banking tried to end this activity, but a few stubborn individual civil servants, mainly in Ostrobothnia, were able to preserve land banking in Finland. In Agricultural Land Consolidation the fields acquired by the Land Bank are transferred to the active farms. Currently Land Banking does not follow any particular rules in Finland. For example in Agricultural Land Consolidations the Employment and Economic Development Centres function as the Land Banking authority. Several different government offices under different ministries acquire land for different purposes without common leadership or policy. The Government should be able to co-ordinate landowning policies more effectively. For example, a huge land reserve could be provided from the land under the administration of Finnish Forest Services for Forest Land Consolidations.

Current Land Consolidation projects in Finland commonly have one main goal. Most commonly it is the improvement of agricultural efficiency. Similar emphasis should be put on traffic safety and nature preservation. Although the three objectives could be exclusive of one another, in reality they seldom are. In Land Consolidations the efficiency of agriculture can be

improved and tractor traffic can be minimized on highways and establishing safe heavens in cultivated areas can support rare species. More co-ordination between different government offices is once again required. It sure is difficult but not impossible.

REFERENCES

Maanmittaus Suomessa 1633-1983, Maanmittaushallitus 1983, ISBN 951-46-662-3

Maankäyttö 1/2006, Pekka V. Virtanen, Asutustoiminta itsenäisessä Suomessa

Metsätilujärjestelyjen tarpeen selvittäminen, Markku Airaksinen, Mikko Honkanen, Maija Läätä, Aaro Mikkola, Maanmittauslaitos 2007, ISBN 951-48-0201-2

<http://fi.wikipedia.org/wiki/Torpparilaki>

<http://fi.wikipedia.org/wiki/Tasoristeysonnettomuus>

http://fi.wikipedia.org/wiki/Laukon_torpparih%C3%A4%C3%A4d%C3%B6t_1907

<http://www.stat.fi/>

<http://www.hs.fi/artikkeli/Karjalaisten+asuttaminen+oli+suuri+ihme/1101977912431>

<http://www.mmmtike.fi/>

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