

Assessment Method for Highway Project Impacts on Real Estates

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SUMMARY

In Finland the planning of new highways, motorways, main roads and other public roads is divided into preliminary and final engineering stages. According to the new Highways Act effective in the beginning of 2006 the preliminary engineering plan shall contain a report on the necessity of the highway and the alternatives studied, the transportation and technical fundamentals, the approximate location of the road, and its estimated impacts e.g. on traffic safety, land use, real estate structure and the environment, and on human health, living conditions and habitability. The plan shall also present options for eliminating or reducing detrimental impacts and a preliminary cost estimate. Further, it is also enacted in the Highways Act that the final engineering plan prepared on the grounds of the preliminary plan shall present the measures, which are necessary for eliminating or reducing the detrimental impacts caused by the road.

A method has been developed in co-operation between the Finnish Road Administration, National Land Survey of Finland, and the Department of Surveying at the Helsinki University of Technology, for the assessment of highway project impacts on real estates. By the method it is possible to reveal and describe the detrimental impacts of a road project on the real estate structure and the use of real estates. The method is bipartite. In the preliminary engineering stage the impacts of the new highway on the real estate structure are studied by a map survey availing e.g. the road plan maps of the Finnish Road Administration, the land data bank and the National Land Information System of the National Land Survey of Finland. This information is specified in the final engineering stage by interviewing the landowners and the authorities.

The objective is that when the impacts of a road project on real estates are assessed already in the engineering stage, it is possible to eliminate or considerably reduce the detrimental impacts of the road by altering the road plan. On the other hand, by the assessment method it is possible to localise the areas where the implementation of the road project can be advanced by realising land consolidation in co-operation with the landowners, thus adapting the land division in the area to the new land use requirements.

The paper discusses the contents of the assessment method and its linkage with the road engineering and land consolidation processes, and presents examples of realised assessment projects and applications.

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1. INTRODUCTION

1.1 Planning process of highway projects and legal road survey

Road traffic forms the main part of the Finnish traffic. Its share of the passenger traffic is 93% and 68% of the goods traffic. Some 65% of the road traffic falls on the network of public roads and the rest on streets and private roads. Statistics on car traffic is compiled separately from the passenger traffic, in addition to which the significance of bicycle and pedestrian traffic on the street network and on the urban public roads is great. In the end of the year 2003 the length of the public roads was 78 197 kilometres, 8 572 kilometres of which were highways, 4 686 kilometres were regional highways, and 64 939 kilometres were other main roads. There are approximately 15 metres of public roads for each resident in Finland.

The present network of public roads in Finland was gradually made up within decades. In the same time the speed and volume of traffic have increased, and the number of vehicles moving on the roads has dramatically increased and changed. These changes induce the fact that traffic safety, traffic-related and technical functioning of roads, and impacts of the roads on the environment and land use must be especially considered in the planning of roads. According to the new Highways Act effective in the beginning of 2006 the planning of new highways, motorways, main roads and other public roads is divided into preliminary and final engineering stages.

The preliminary engineering plan contains a report on the necessity of the highway and the alternatives studied, the transportational and technical fundamentals, and the approximate location of the road. The preliminary engineering plan shall also define in an authentic manner all the estimated impacts of the road e.g. on the road and traffic conditions, traffic safety, land use, land division, and the environment. This shall be based on surveys, where necessary. Further, the preliminary engineering plan shall consider the impacts on human health, living conditions and habitability. The plan shall also present options for eliminating or reducing detrimental impacts and a preliminary cost estimate.

The preliminary engineering plan must be prepared unless the impacts of the project are minor or the location and impacts of the road are already resolved on the detailed or legally consequential master plan. The preliminary engineering plan must always be prepared for projects where the assessment procedure imposed in the Act on Environmental Impact Assessment is applied.

In practice, the preliminary engineering plan of a highway project stated in the Highways Act is based on the preceding preliminary engineering stage. At this preliminary engineering

stage the occurred changes in the needs of movement and traffic conditions are revealed and the measures for meeting the objectives set for developing the traffic conditions are considered. Outcome of the preliminary engineering plan are the objectives, principal routing options, and approximate impact assessment and cost estimates.

After the preliminary engineering stage a final engineering plan has to be prepared and approved prior to the construction of the highway. In case of an improvement of a highway with minor impacts, preparation of the final engineering plan is, however, not necessary if no extra land is expropriated or if the owner of the real estate has given a written consent to the expropriation of the area.

Preparation of the final engineering plan is detailed planning of the various parts of the highway generally based on the basic solutions presented in the preliminary engineering plan. The final engineering plan shall present the exact location of the highway and the areas required for it, the junctions of public and private roads and other road readjustments, so that the road area can be staked out on the terrain. The plan shall present the measures, which are necessary for eliminating or reducing the detrimental impacts caused by the road. The landowners must be heard when preparing the final engineering plan, and the plan shall consider the land ownership conditions, as far as possible. The plan shall also include a cost estimate.

Road survey is a legal cadastral survey in accordance with The Highways Act. In this survey the road area designated for a road and the attendant rights are expropriated to the party responsible for the maintenance of the road. The party responsible for the maintenance of the road may take possession of these areas on a point of time specified at the possession inspection held in the road survey. Compensations to the landowners and potential other parties for the expropriated areas and the inconveniences and damages caused by the road project are also determined in the road survey, and the necessary cadastral measures are taken.

The legal road survey is carried out by a land surveyor employed by the National Land Survey together with two trustees nominated by the local municipal council.

1.2 Land consolidation in connection with a highway project

According to the Highways Act a beneficial use of real estates shall be secured, where necessary, by land consolidation and road readjustments. There are three types of land consolidation implemented in connection with road projects: land-for-land exchanges, land reallocations and road readjustments.

1.2.1 Land-for-land exchanges

Land-for-land exchanges are used for altering and improving land locations between individual register units, e.g. when a road splits a real estate so that a part of the real estate on

the other side of the road is difficult to use. According to the Highways Act a land-for-land exchange between real estates can be implemented if:

- 1) it is necessary for correcting the fragmentation of land due to the highway;
- 2) it can eliminate or considerably reduce the costs or compensations otherwise arising from constructing a new passage to replace the former one cut off by the highway;
- 3) the exchange or transfer of land in order to give additional land to a real estate adjoining the highway or located in the buffer zone or in the lateral clearance area is particularly important for increasing the usability of the real estate due to the road construction or building prohibition in the buffer zone or lateral clearance area; or
- 4) it is necessary for transferring an area of minor value, which would remain separate because of the highway, to another real estate the owner of which cannot appropriately use, but which may be used in connection with the other estate.

Land consolidation furthermore requires that:

- 1) it results in a substantial improvement to land division when land is inconveniently fragmented (item 1 above);
- 2) it will cause no significant inconvenience to anybody; and
- 3) it will not hinder the implementation of the local detailed plan.

Land consolidation in connection with legal road survey does not require the consent of the owner of the real estate or the holder of a lien or a special right thereon.

1.2.2 Project-related land consolidation

If land consolidation is able to remove or decrease the considerable harm caused to the users of real estates by the realisation of a public road, railway, power line, airport, or other such project, the land consolidation may also be applied for by the party intending to carry out the project. Such land consolidation may be carried out according to the Property Formation Act if the benefits gained are considerable and its implementation is otherwise appropriate. Land consolidation may also be applied for by the owner or co-owner of a real estate.

In practice, land consolidation is appropriate in cases where the implementation of a large infrastructure project causes land fragmentation or other significant harm to the real estates in the area. Such land consolidation is an areal readjustment procedure improving, in addition to land division, complicated traffic connections and traffic safety.

1.2.3 Road readjustment

The final engineering plan shall present the locations of private road junctions and the private road connections leading to these junctions. The road maintenance authority is in charge of constructing the junctions and the private roads, and conveys them to the users when completed.

These questions related to private roads are treated in a legal road survey, as well as other matters related to the use of private roads, i.e. who are the members of the road maintenance association and how the obligation to maintain the road is shared between the members.

According to the Highways Act a legal road survey may, on request of the road maintenance authority, be extended to a regional road survey according to the Act on Private Roads (38 c §), by which the private roads may be readjusted more widely than presented in the final engineering plan.

Regional road survey is appropriate in areas where the rights of way are unclear or where, due to changes in the traffic conditions, construction or discontinuation or rearrangement of roads is necessary in order to meet the changed conditions. In the regional road survey the existing roads or their buffer zones are considered in relation to traffic safety and land use.

Agriculture causes plenty of internal and slow-speed traffic in agriculture-intensive areas. Junctions of private roads leading the slow-speed traffic to the highways are a clear safety risk to the faster-speed long-distance traffic. Traffic safety is always improved when a junction is discontinued and the traffic is settled by road readjustments. On the other hand, the prolongation of transport distance may have an impact on the farming cost-effectiveness. Inconveniences caused by indirect routes shall be especially considered in the road readjustments.

2. ASSESSMENT OF HIGHWAY PROJECT IMPACTS ON REAL ESTATES

An assessment method for highway project impacts on real estates has been developed in cooperation between the Finnish Road Administration, National Land Survey of Finland and the Department of Surveying, Helsinki University of Technology. By this method it is possible to find out and describe the detrimental impacts of a highway project on land division and use of real estates, and study the options for reducing such impacts. The method is two-stage and concerns the different stages of the engineering plans. At the preliminary engineering stage the impacts of a new highway on the land division are studied by an overall map review. At the final engineering stage the data is specified e.g. by interviewing the landowners and hearing the authorities.

2.1 Impact assessment at the preliminary engineering stage

It is appropriate to consider the needs for land consolidation at highway projects already at the preliminary engineering stage. Thus the options arising may be considered when preparing the detailed final engineering plan and the detrimental impacts may be eliminated or remarkably reduced by the solutions presented.

Investigation of the need for land consolidation according to the new method is an essential part of the preliminary engineering stage. In practice the surveys and the assessment of highway project impacts takes place so that the road authority and the National Land Survey of Finland generally investigate the areas where land consolidation is appropriate. This is

done before starting the preliminary engineering stage. After this the Finnish Road Administration orders a report on the impacts of the road on the land division from the National Land Survey of Finland or some other specialist in the field. The report will be prepared as map surveys availing e.g. the data in the Land Data Bank System, base maps, the IACS dataset for field parcels of the EU, and data of the various routing options prepared by the Finnish Road Administration for the highway project.

The needs report will especially consider the necessity for discontinuing junctions and the options for diminishing the need of constructing overhead bridges and underpasses and reducing the inconveniences caused to agriculture and forestry by means of land consolidation and service road arrangements. If discovered at the preliminary engineering stage that land consolidation may bring cost savings in constructing the highway, reduction of inconveniences caused by the road or improvement of the traffic safety, detailed planning of land consolidation will be connected to the final engineering stage of the highway.

The report will present the impacts of the highway on the areal land use and land division. The report will include, e.g.:

- overall presentation of the impacts of the highway on the areal land use and land division;
- when necessary, the required measures for diminishing the inconveniences caused to the land division (e.g. suggestions for constructing new service roads and for land consolidations and road readjustments);
- recommendation for a possible land consolidation related to the particular project or regional private road survey;
- map presentation overall describing the required measures.

The report may also present a preliminary estimate on the benefits and costs of the suggested road readjustments and land consolidation.

2.2 Impact assessment at the final engineering stage

Should the report on the impacts of the highway project on the land division prepared at the preliminary engineering stage give any cause, the analysis of the impacts of the highway on the land division and use of the real estates shall be further specified at the final engineering stage. The data collected at the preliminary engineering stage will then be updated e.g. by the information obtained from the final detailed engineering plan up to the level of real estates, units, junctions and private roads.

Hearing the landowners and authorities by interviews and arranging informative meetings in the impacted area are an essential part of the interactive process at the final engineering stage. The final report will present in detail the impacts of the project on the land division (fragmentation of the real estates, indirect routes, discontinued junctions, substitute passages, etc.). The report will further contain thematic maps presenting the impacts of the highway on the land division on the unit level and the recommended measures of implementation.

The report will also include a cost-benefit estimation, which compares the planned situation to a situation where the inconvenient impacts of the highway are not eliminated by road readjustments and land consolidation (0 option). The benefits in money may be, for example:

- improved traffic safety caused by the discontinuation of junctions (data obtained from the studies of the Finnish Road Administration);
- construction costs of the junctions, overhead bridges and underpasses thus becoming unnecessary due to road readjustments and land consolidation (cost data obtained from the studies of the Finnish Road Administration);
- benefits to agriculture caused from the growth of parcels and decrease of travel and transport costs (benefit data obtained from the studies of the Finnish Road Administration).

The following may be considered as implementation costs of the project, which the benefits are compared to:

- land consolidation costs (obtained from the studies of the National Land Survey of Finland) and
- constructions costs of the service roads, junctions, etc. required for the implementation of road readjustments and land consolidation (cost data obtained from the studies of the Finnish Road Administration).

3 CONCLUSIONS

The method herewith presented for the assessment of highway project impacts on real estates has been tested in practice and it has proven applicable. It is noteworthy that the method is based on the existing map and register material. By means of modern land data bank systems (e.g. the JAKO System of the National Land Survey of Finland) these materials easily offer all the necessary data for assessing the impacts of a highway project on land division and how these impacts can be eliminated or reduced by land consolidation and road readjustments.

If the impacts of a road project on real estates are assessed already at the preliminary engineering stage, the detrimental impacts may be eliminated or substantially reduced by reconsidering the plans. On the other hand, by means of this assessment method it is possible to locate the areas where the implementation of the road project may be advanced by a more extensive project-related land consolidation or a regional road readjustment in co-operation with the landowners, road authorities, and the National Land Survey of Finland, thus adapting the areal land division to the altered land use requirements. The developed method is also applicable to other route projects, e.g. to the assessment of railway and channel project impacts on real estates.

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BIOGRAPHICAL NOTES

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