

PAPER • OPEN ACCESS

## Methodical peculiarities of state regulation of the wayside protective zones in Ukraine

To cite this article: I O Novakovska *et al* 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **708** 012016

View the [article online](#) for updates and enhancements.

## Methodical peculiarities of state regulation of the wayside protective zones in Ukraine

I O Novakovska<sup>1</sup>, P F Zholkevskiy<sup>1</sup>, M P Stetsiuk<sup>1</sup> and N F Ishchenko<sup>2,3</sup>

<sup>1</sup>Department of Land Management and Cadastre, National Aviation University, 1 Avenue Cosmonaut Komarov, Kyiv, Ukraine

<sup>2</sup>Institute of Agroecology and Nature Management of NAAS, 12 Metrolohichna Street, Kyiv, Ukraine

<sup>3</sup>Email: natakai@ukr.net

**Abstract.** The sizes of the areas of influence, protected zones, and reserved technological areas are contemplated here. There is also an analysis of modern use and following the wayside zones of motorways. The situation with pollution of roadside strips, surface waters, soils, groundwater and roadside vegetation has been analyzed. Solutions on lands protection and creation of prerequisites for the motorway protected zones formation are provided. It has been substantiated that the solution of these problems should be based on the application of mathematical methods and computer simulation with the use of remote sensing and requires detailed geographic research to the level of specific, quantitative justification of transport infrastructure projects in order to ensure optimal land use, recultivation. The comparative analysis of the regulatory requirements of the location highways elements of the and Ukraine, Belarus and the USA roadside territories has been conducted. The advantages of creating space data infrastructure for roadside establishment are elaborated. Establishing the sizes and configuration of the protection zones in the structure of the project documentation for the construction (reconstruction) of highways, as well as their indication in the town planning documentation, on cadastral plans will lead to the introduction of responsibility at the legislative level.

### 1. Introduction

At present stage of the development of the country, the transport branch is among the prospective ones. The quality of transport arterials predetermines economic, social, ecologic, cultural aspects of the functioning of a country, its future growth, and its position on an international stage. The conditions and development of a motorway network create a tight connection between investment, integration, social and economic, economic and ecological, anti-crises, civilization processes in society.

In the meantime, the transport branch, despite all its positive aspects for the economic and social development of a country, has a significantly negative effect on the environment. This refers to harmful exhaustive fumes, emission of substances related to the use of tires and breaks, salts for melting snow, disposal of used materials and spare parts, as well as noise contamination to nature [1].

The matter of a holistic and comprehensive evaluation of the influence of transport infrastructure, able to synthesize adequately the whole scope of manifestation of this object of engineering infrastructures is the one less studied nowadays. Limited is the number of attempts to raise these questions, and the same of the solutions, although fragmented and quite schematic. Scientific researches, and practical ones even more, are focused on the exclusively economic assessment of



isolated consumable features of territories. The lands are studied as those used for farming, forest activities, building motorways, and other projects.

## 2. Presentation of the main research material

Considering how important is it to protect people and environment, adjacent lands, and different objects of nature against the harmful influence of transport, laws stipulate the creation of protective zones lengthwise the transport systems.

The state regulates the protective zones by a range of rules and regulations, inter alia by the respective environmental demands to the motorways.

Designing. GBN V.2.3-218-007:2012 [2] divide them as follows: an influence wayside, a protective wayside, a reserve-engineering wayside.

The sizes of the influence, protective, and reserve-engineering waysides are provided in table 1 [2].

**Table 1.** Approximate sizes of influence, protective, and reserve-engineering waysides.

Territory, adjacent to a motorway	The distance from the edge of a traffic way to different classes of natural objects, m		
	I	II	III
Upon condition of free distribution of the influence			
Influence waysides	3000	2000	600
A protective wayside	300	150	60
A reserve-engineering wayside	30	12	7,5
In the case of hindrances (terrain, forests, built-up environment, landscaped areas)			
Influence waysides	1500	1000	600
A protective wayside	200	90	30
A reserve-engineering wayside	30	12	7,5

The sizes of the influence waysides of motorways depend on the results of prognostic assessment of harmful emissions of contaminants, and the distribution of physical influence. [2].

Road engineering structures, like bridges, pipe culverts, drainage gutters, etc. cause water erosion of soils on roadside territories. The surface drainage caused by the precipitations, melting snow, and watering roads washes different soluble and insoluble substances and brings them to adjacent territories. A concentration of these contaminants depends on the frequency of cleaning streets, the intensity of traffic and precipitations, the length of a previous period without precipitations.

Any wayside is specific not only by contamination to surface waters, but also by the same to soils, soil waters, and roadside-growing plants. Contamination of the ground surface with transport and road emissions aggregates gradually, depending on the number of vehicles passing a highway, a road, a motorway. It remains for a very long period, even after removal of the body of a road (in case of a road, highway, the motorway is closed or a road and its asphalt cover are removed completely). Different chemical elements, especially metals, tend to be accumulated by the soils. Then plants digest them and pass through a food chain to animals and people. Some chemicals dissolve and come with ground waters to rivers and other water mains. They can get to the human body in drinking water. The practice proves that small-dispersed solid particles and toxic components in the soil are as less concentrated, as bigger is the distance from a road surface [3].

Steadily developing is now the situation with illegally ploughed waysides. Leaseholders and proprietors illegally cultivate lands along the roads. They grow crops and sell their harvest to the food industry. As a rule, there are the most widespread cultures: sunflowers, corn, and wheat.

The examples of such illegal cultivation are observed in every region of our country. This situation is illustrated by figure 1.



**Figure 1.** Use of the wayside: a - Odessa region, b - Kiev region.

The picture demonstrates that the adjacent lands are seeded just next to the easement areas of motorways. There is an enormous quantity of such examples. Neither the proprietors, not the leaseholders meet the respective rules. This causes contamination of the agricultural plants with heavy metals; a domino effect brings them to human bodies in a daily food, like bread, oil, butter, eggs, meat, and others. Low quality of food thus leads to many severe diseases. The occurrence of the diseases and distribution thereof are determined by environmental and social-economic factors. Their importance grows steadily due to the way of life, level of income, housing conditions, and structure of nutrition.

In such conditions, topical become the matters of protection of the lands. To create the preconditions for the protected areas around the roadways, and to improve and eliminate the situation, it is important to take measures on the level of the law to make such use of the lands strictly forbidden:

1. to implement a system of strict fines for the landlords and users of the lands for the illegal ploughing;
2. to obligate the landlords and the users of the lands to cultivate the plants lengthwise the motorways, intended for production of alternative types of fuel if there is no greenery to hold back the harmful emissions;
3. to increase the size of the waysides, especially for growing crops;
4. to elaborate a method for assessment of damage, caused by unauthorized use of the land plots;
5. to elaborate rules and standards for the sphere of protection and use of the lands;
6. to create an automatic informational system for revealing the cases of land laws infringements, especially unauthorized use of the lands;
7. to ensure the implementation of reserving the lands for the needs of road transport and infrastructure.

First, the solution of these tasks shall be based on the wide use of mathematic methods and computer-aided simulation with the means of remote sounding. It demands detailed engineering-geographic investigations to reach the level of a certain quantitative-grounded project of transport infrastructure to ensure optimal land management and re-cultivation. The new IT-technologies are supported by the databases of digital cartographic information and by the modern digital methods of topography-geodesy and GPS measurements, remote sounding of lands, digital photogrammetry, promoting the development of geo-informational cartography that is the functioning environment thereof. All these results in a database of digital geographic information, able to become a new kind of geo-basic information product to be applied to study the influence of transport objects on the natural environment.

Among the main advantages of the space data infrastructure for definition of the waysides, there are less expenses on collection, processing, and support of geo-basic data, improved quality and speed

of upgrade of the data, a surplus effect thanks to the new technology of accumulating information from the different sources and remote access thereto. The main purpose thereof is to ensure equal and equivalent access to geo-informational resources on traffic and road infrastructure for state bodies, commercial institutions, and the public.

The Resolution of the Cabinet of Ministers of Ukraine of March 30, 1994 № 198 “On Approval of the Unified Rules for Reparation and Maintenance of Motorways, Streets, Railroad Crossings, Rules on Use and Protection” (as amended) provides the following definition of the waysides:

1. the waysides of the motorways (suburban) on the areas of the roads of state importance of I, II, and III category, built or being built in circumvention of cities, towns, and villages shall be not less than 100 meters;
2. the waysides of the approaches to regional centers and big industrial centers shall be not less than 50 meters;
3. the waysides of the areas of roads of state importance between the settlements shall be not less than 32.5 meters [4].

There are some restrictions to economic activities within the limits of the areas as indicated, although they are not regulated by laws.

The waysides (the waysides are controlled areas, road-side protection areas, etc.) of the motorways vary in different countries. Their width may be from 20 to 150 meters.

Analysis of the statutory requirements to elements of placement of the motorways and waysides in Ukraine, Belarus, and the USA has shown that sizes of waysides and road-adjacent territories in Belarus, except for road construction elements, stipulates placement of service objects, while in Ukraine road service objects are located out of the waysides. In Belarus, construction of the motorways stipulates designed waysides for any objects thereon to be controlled by the road's owner. The waysides are intended to ensure traffic safety, proper conditions for reconstruction and overhaul of the roads, considering perspectives of development.

The width of motorways in Belarus is up to 100 meters to both sides from the axis thereof; in settlements, waysides are the land plots towards the borders of an existing built-in environment [5]. In Belarus, the road owner's territory also includes a reserved area – a land plot, reserved for future building or reconstruction of the motorway [6]. In Ukraine, albeit the waysides are stipulated, their management lacks legislative regulation.

As for parameters of placement elements of road facilities in the USA and Ukraine, it was discovered that junctions in the USA are not very frequent. The distance between them along autostrada equals 100 km (or one hour of driving), while in Ukraine they are each 35 km on the 1st category roads. Stops in the USA are placed on crossroads, while in Ukraine inversely they are located more than 50 meters far from the crossroads.

Thus, to sum up, the comparison of the regulative requirements of Ukraine with the same of other countries, we could point out the basic ones. Some parameters of motorway elements in different rules and regulations of Ukraine argue each other; the distance between the service objects in the USA is regulated more, than in our country. In Ukraine, while designing a motorway, only a way for placement road constructive elements is to be ensured, while territory for road facility buildings is not stipulated, unlike Belarus. We have discovered the need for regulative support of the respective management and maintenance of the waysides and reserve zones [7].

While establishing the waysides, it is worth to emphasize that the land plots within the limits of the waysides indicated are not withdraws (purchased); to prescribe certain restrictions for building economic objects in indicated areas; to stipulate a possibility to preserve agricultural lands.

To ensure protection of roads against destruction in parts thereof endangered with soil displacements and erosion, some special protective areas have been already prescribed by the “Instruction on the procedure of allocation and management of waysides of the motorways in the Ukrainian SSR” by Council of the Ministers of Ukrainian Soviet Socialistic Republic in August 4, 1962, № 876 (as amended) without including thereof into the right of way [8].

The article 112 of the Land Code of Ukraine prescribes the creation of protective zones longwise the transport lands to protect them against negative anthropogenic impact. Namely, in areas specific

for soil displacements, landslides, washouts, mudslides, snow-wreaths, and other dangerous impacts, protective areas are stipulated longwise the lands of railway transport [9].

Although the procedure of allocation of the areas described above, their sized and regime of management still have not been defined by the Cabinet of Ministers of Ukraine [10].

Protection of the motorways against the water and wind erosions, imbibition, landslides, avalanches, snow-banks are as important, as protection of the railways. The road facilities include already counter-avalanche and counter-mudslides structures and plants, drainage and water treatment plants for motorway protection.

It is expedient to say that sizes and configuration of protective zones are stated by design documentary for building (reconstruction) of the motorways, while borders thereof shall be indicated in city-planning documentary and documentary on land development and cadaster plans.

As for restriction of activities in the protective areas, they shall prohibit deforestation, construction of any building not related to the protection of the roads, any activities promoting processes of erosion and waterlogging of the lands.

### 3. Conclusion

The use of the waysides causes a range of questions not regulated by the laws. To solve the tasks of land protection and the creation of preconditions for stable land management in the country, we offer a law-based implementation of the measures able to improve the situation. As a result of research, it has been proved that the land granting for reservation for autostrada's construction gives the opportunity to include them in the documentation of land management. Defining sizes and configurations of the protective zones within design documentary for construction (reconstruction) of motorways, as well as indicating thereof in city-planning documents, land-development documentary, and cadaster plans shall support the implementation of responsibility on the level of laws.

### References

- [1] Boichenko S, Zaporozhets O 2017 *Transport ecology manual*. (Ukraine: Center for Educational Literature) p 508
- [2] Ecological Demands to Motorways. Designing. GBN V.2.3-218-007:2012. Dated Aug.06, 2012 307
- [3] Perovych L, Vanchura L 2011 The Impact of the Motor Transport on Contamination of the Land Resources (*Ukraine: Modern Achievement of Geodesy Science and Industry*) **21** 102-109
- [4] On Approval of the Unified Rules for Reparation and Maintenance of Motorways, Streets, Railroad Crossings, Rules on Use and Protection of 30 03 1994 № 198
- [5] Novakovskaya I O, Ischenko N F 2017 Problems of land allocation and use for the needs of the road economy. (*Ukraine: Modern issues of economics and law*) **1 (5.6)** 135-144
- [6] Novakovs'ka I, Ishenko N 2017 Transport strategy of Ukraine in the context of European integration Latvia: Collective Monograph 248
- [7] Black W R 2010 Sustainable Transportation: Problems and Solutions. *The Guilford Press* 1 edition January 4 p 299
- [8] On Motorways of Ukraine: the Law of Ukraine of September 08 2019 № 2862-IV
- [9] On Transport: the Law of Ukraine of November 10 1994 № 232/94-BP
- [10] On Regulation of City-Planning Documentary: the Law of Ukraine of February 17 2011