

1.	GENERAL DESCRIPTION OF THE PROJECT	2
2.	DESCRIPTION OF THE ELEMENTS OF THE ENVIRONMENT COVERED BY THE PREDICTED IMPACT OF THE PROJECT	
2.1.	Geological structure and hydrogeological conditions	2
2.2.	Soil	2
2.3.	Surface water	3
2.4.	Air and climate	3
2.5.	Acoustic environment	3
2.6.	Living nature and land development in the vicinity of the planned motorway	5
2.7.	Protected areas	7
2.8.	Description of the existing historical monuments situated in the immediate vicinity or within the impact zone of the planned project, which are protected pursuant to the regulations on monuments' protection and conservation	7
3.	DESCRIPTION OF THE PROJECT OPTIONS	8
3.1.	Option that proposes not to proceed with the project implementation	8
3.2.	Implementation options	9
4.	PREDICTED EFFECTS ON THE ENVIRONMENT	10
4.1.	Effects on the land surface and soil	10
4.2.	Effects on the surface water and groundwater	10
4.3.	Effects on the acoustic environment	12
4.4.	Effects on the free air	13
4.5.	Effects on the living nature	13
4.6.	Effects on the landscape	16
4.7.	Effects on the protected areas determined in separate regulations	19
4.8.	Effects on the protected cultural goods	19
4.9.	Effects on human health	23
5.	DESCRIPTION OF MEASURES PROPOSED TO AVOID, REDUCE AND OFFSET ADVERSE EFFECTS ON THE ENVIRONMENT AND THEIR ASSESSMENT	24
5.1.1.	Effects on the land surface and soil	24
5.1.2.	Effects on the surface water and groundwater	24
5.1.3.	Effects on the acoustic environment	25
5.1.4.	Effects of vibrations	37
5.1.5.	Effects on the free air	38
5.1.6.	Effects on the living nature	38
5.1.7.	Effects on the landscape	38
5.1.8.	Effects on monuments and archaeological sites	38
5.2.	Recommendations for the EIA audit and monitoring	39
6.	CONCLUSIONS	39
	Annex No 1 Location of the planned investment project	
	Annex No 2 Location of equipment protecting the environment and EIA audit sites	

1. GENERAL DESCRIPTION OF THE PROJECT

The planned project proposes to construct a motorway between Łódź and Warsaw: from the boundary of the Łódź / Mazovia Voivodeship, at kilometre 411+465.80, to Konotopa Interchange, at kilometre 456+239.67, (including the interchange). It will be a toll motorway.

This section is part of the A2 motorway: the state border - Świecko - Poznań - Łódź - Warsaw - Biała Podlaska - Kukuryki – the state border.

The planned motorway section is located in the Mazovia Voivodeship and runs through the following municipalities: Wiskitki (Żyrardów District), Baranów, Jaktorów, Grodzisk Mazowiecki, Milanówek (Grodzisk District), Brwinów, Pruszków, Piastów (Pruszków District), Ożarów Mazowiecki (West Warsaw District).

It is planned to implement the project in the following stages:

- Stage I: construction of two dual-lane roadways (with a tree-lane section from Pruszków Interchange to Konotopa Interchange),
- Stage II: widening of the motorway to add an additional lane to each roadway.

This aims to achieve two tree-lane roadways to Pruszków Interchange and two four-lane roadways on the section from Pruszków to Konotopa Interchange.

The Konotopa interchange will connect the motorway to the transport system of the capital city of Warsaw.

Allocation of land in order to construct the planned section will have the following direct environmental effects:

- adaptation of the existing agricultural and forest land for transportation purposes,
- removal of the vegetation in the way of the road,
- local changes to the terrain configuration,
- changes to the landscape due to the construction of interchanges, viaducts and bridges.

The motorway construction is envisaged to bring about:

- positive effects: it will considerably relieve traffic on some existing roads,
- negative effects on the environment in the immediate vicinity of the used land caused by the impact during the construction phase and traffic during normal operation (noise, dust and gas emission),
- the development of land around the motorway interchanges and services, and possible emissions into the environment from these facilities.

The planned motorway has been introduced to all adopted local development plans, as the decisions concerning its location have been already issued.

2. DESCRIPTION OF THE ELEMENTS OF THE ENVIRONMENT COVERED BY THE PREDICTED IMPACT OF THE PROJECT

2.1. Geological structure and hydrogeological conditions

The land relief is undiversified. Maximum differences in height along the whole discussed section do not exceed 10m. Generally, the land relief (landform) and the geology of subsurface formations were formed in glacial periods.

The first usually unconfined groundwater table is located 2m below the land surface (between 2 and 5m). The particularly favourable conditions for such a shallow water location are to the north of Brwinów and Milanówek. The only groundwater table located deeper (over 5m below the surface) can be found within the region of Pruszków and Konotopa. The areas with the water table located at the depth between 0 and 2m increase towards the west. Shallow groundwater tables are particularly characteristic of river valleys.

Along the section Feliksów – Natolin, the shallow groundwater table is usually located between 2 and 5m below the surface. Occasionally, it can be located between 0 and 2m below the surface. Further west (from Feliksów to the boundary with the Łódź Voivodeship), the unconfined groundwater located up to 2m below the surface dominates.

The Main Useful Aquifer is well isolated from the surface, which means that in practice there is no threat of contamination by the planned investment project.

The environment monitoring conducted by the Inspectorate for Environment Protection within the framework of the national monitoring of the environment shows that the groundwater that covers a considerably large area (to the region of Milanówek, Brwinów, at approx kilometre 445+000 to 447+000) is of an average quality and requires simple treatment when used as drinking water. The shallow groundwater within the Warsaw Conurbation (from approx kilometre 445+000 to 447+000 to the end of the discussed section) is usually of poor quality. The limit values for drinking water contamination are often exceeded.

2.2. Soil

Arenosols, brown soils and luvisols formed from clayey sands and clays dominate within the region of the planned motorway. Podzols formed from cover sands occupy a considerable area. The planned motorway crosses the younger soil mosaics formed from minerals and organic matter in numerous river valleys. The most common in these regions are deluvial and alluvial humous soils, podzolic soils and black earths that developed from boggy soils as mineral soils, and mucky and peaty soils as organic soils.

The majority of soils in the western part of the analysed motorway fall within average and lower quality classes (from IV to VI). There are some class III soils. In the middle and eastern parts of the analysed motorway, there are large areas of soil classes that range from I to III.

The arable land covers the majority that is almost 70% of the area in the vicinity of the motorway. Pastures cover over 20% of the area. The remainder is allocated for development and traffic routes; it covers uncultivated land, forests, orchards and water reservoirs.

2.3. Surface water

There is a dense surface water network in the immediate vicinity of the planned section of the A2 motorway that comprises natural watercourses and artificial drainage ditches.

The Bzura River is a main drainage channel for the area surrounding the planned motorway. The motorway crosses several dozen watercourses: mostly the drainage ditches. The planned motorway will cross the following rivers: Sucha Lewa, Sucha Nida, Guzowski Waterway, Pisia Gągolina, Wierzbianka, Pisia Tuczna, Mrowna, Rokitnica Stara, Zimna Woda, and Utrata. In addition, the motorway nears the Żbikówka River at the end of the section (nearby Konotopa).

2.4. Air and climate

The climate of the analysed area is diversified spatially and has a transitional character between maritime and continental types. The continental climate becomes more influential towards the east, which brings about lower average temperatures in winter, larger differences in temperatures, and a shorter vegetation period. Mean annual air temperatures in the analysed area range from 7.5 to 8.0°C (the temperature raises towards the west), and the annual average precipitation is from 450 to 600mm.

The landform, its development, exposure and location in relation to larger parts of forests and a pattern of river valleys diversify climate conditions in the immediate vicinity of the planned motorway. All these factors influence the local climate. The diversity of climate of particular A2 sections depends more on how the surrounding areas are developed. For this reason, sections that are used for different purposes can be isolated, which is also related to the local climate conditions. There are basic differences between these areas in temperature (in particular the temperature at ground level) and humidity. In spring, the area without any vegetation (croplands) heats faster than grasslands, pastures or uncultivated land. Forest lands have the highest humidity.

The Voivodeship Inspectorate for Environment Protection in Warsaw controls the air quality.

The 'Report for 2002: The Annual Assessment of Air Quality in the Mazovia Voivodeship' shows exceedances of PM10 limit values increased by their tolerance margin in the Pruszków District. For this reason, the Voivode of Mazovia determined, by way of regulation, a programme of air protection for the aforementioned area. The programme recommends that the transit traffic bypasses towns, their centres and their most polluted parts.

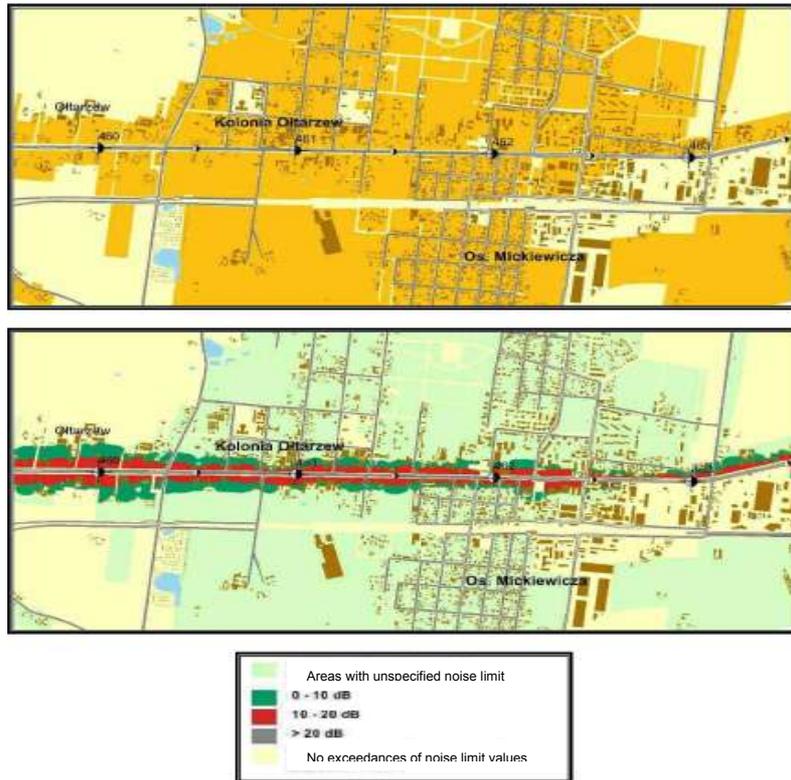
2.5. Acoustic environment

The acoustic environment is influenced by the following sources of noise: road, rail and air transport systems, industrial plants, services, high-voltage power transmission lines and others. One of key factors that influence the acoustic environment is certainly the noise produced by transport systems. In non-urban areas, this is mostly road traffic noise. Other sources of transport and rail noise are certainly local.

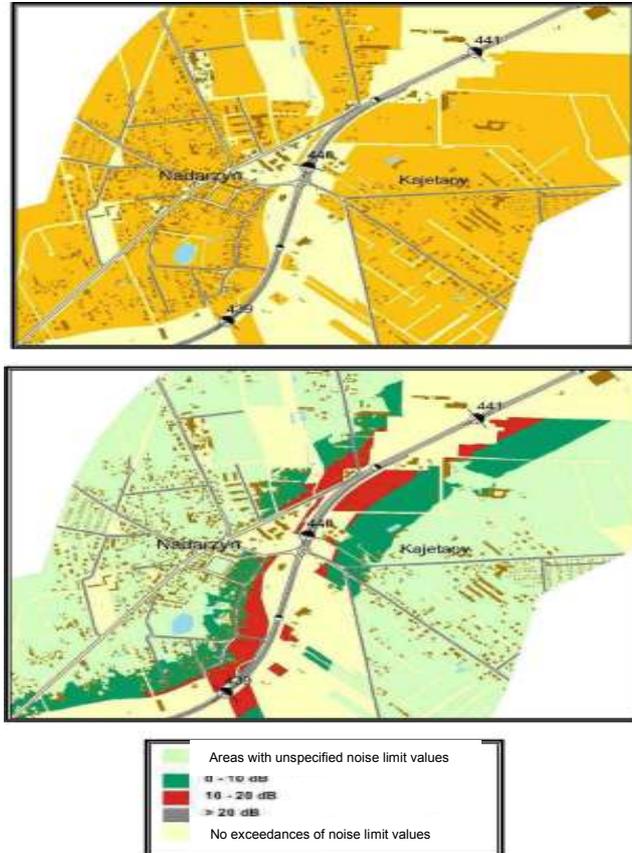
The planned A2 motorway, the section from the boundary of the Łódź / Mazovia Voivodeship to Konotopa Interchange will be located between the existing national roads No 2 and 8. At present, there is heavy traffic on these roads. The planned motorway will aim to relieve traffic on these roads – it will move the considerable part of motor traffic onto the section from Łódź to Warsaw.

The acoustic environment in the vicinity of the existing national roads is mostly created by these roads and their heavy traffic. The traffic will increase in the next years, which will result in the traffic noise covering more areas and the worsening of the acoustic environment. To protect the housing estates located in the immediate vicinity of these roads would require building-in appropriate mitigation.

However, the construction of a road in the areas with fewer housing estates that will take part of traffic is a better solution. The noise maps of these national roads' sections that were produced in 2007 using the traffic flow information collected over a long time confirm this conclusion. The examples of noise map fragments for the analysed sections of existing roads are shown in pictures 2.1 and 2.2. Based on the analysis of these maps, it may be claimed that the existing national roads No 2 and 8 cause nuisances to all areas in their vicinity, for which the noise limit values have been set (areas marked in orange in the first map).



Picture 2.1 Map of the night-time exceedances of noise limit values (LN) in Ołtarzew by national road No 2



Picture 2.2 Map of the night-time exceedances of noise limit values (LN) in Nadarzyn by national road No 8

2.6. Living nature and land development in the vicinity of the planned motorway

A landscape's description and assessment is based on a site visit, photographic documentation and an orthophotograph.

The landscape within region of the motorway location is undiversified. The monotonous flat areas with some diversification (river valleys, woodlands) dominate. Four basic landscape types have been isolated within the examined area. Landscape types have been identified on the basis of the following basic criterion: a degree or quality of changes introduced to the landscape in relation to the degree of damage to the environmental balance and man-made changes. The following landscape types have been isolated:

- Landscape similar to the natural landscape, which involves woodlands, forest meadows and clearings, and river valleys,

- Natural and cultural landscape, which involves overgrowing meadows, an agricultural-woodland landscape (small woodland areas in meadows and fields), and an agricultural landscape (meadows, fields, drainage ditches, filed hedges, individual farmsteads, home gardens, and orchards),

- Cultural landscape related to human settlements

- Degraded cultural landscape, which involves transport routes and areas surrounding power lines.

The planned investment project runs mostly through the areas that are classed as similar to the natural landscape, and the natural and cultural landscape. In terms of size, the harmonious cultural landscape, which involves the arable land, meadows, and some forests, groves and orchards, covers the largest area. Most of all, it comprises woodlands, grasslands, fields with small forest areas and individual farmsteads, and uncultivated land with groups of natural hedges.



Picture 2.1 Uncultivated land in the region of Pruszków

Within the boundaries of the Mazovia Voivodeship, the analysed A2 motorway mostly runs through agricultural areas, which are intensely cultivated as arable lands and meadows. The eastern motorway section, from Koszajec onwards, runs through more urban areas, where a considerable land percentage is allocated for urban and industrial development. This part is comprised of large areas of undeveloped land, the majority of which are abandoned arable lands, meadows or devastated areas. Such areas are in different stages of ecological succession.

Forests occupy less than one percent of the described area. Small patches of forests are usually located at the edges of a road right-of-way, and never within the road right-of-way boundaries.

In practice, there is no intensive large-scale orchard management to produce goods. Mainly apple trees, cherry trees and currants are cultivated in small areas surrounding the motorway (mostly in its final section). Traditional, small orchards by the houses, typical of agricultural areas (with apple, plum and less often pear trees), must be noted.

Various hedge types, which comprise groups and avenues of trees that differ in age and species, are the key element of the Mazovia landscape. They are usually located near watercourses, farmsteads and traffic routes. Such hedges are scattered along the whole motorway section with the largest clusters in the middle.

The following valuable objects have been identified on the planned motorway route (they are listed according to their location at particular kilometres, not according to their importance):

1. An occupied white stork's nest on a poplar situated within a road right-of way at kilometre 413+850.
2. A single site of Common Centaury situated in dry meadows, approx 10 to 30 metres to the south of the right-of-way boundary (at kilometre 414+550). The implementation of the investment project can partially destruct the habitat of this species, mainly due to the physical damage during the motorway construction or changes to water regime. 32 sites of the species have been found in the Bolimów Landscape Park. It is an endangered species in central Poland.
3. A complex of wet meadows with Willow Brush situated in the Sucha Nida valley (from kilometre 417+500 to kilometre 417+700) to the south of the road right-of-way boundary: an animal sanctuary (roe deer, cranes and white storks have been seen).
4. A white stork's nest on a tree in the south-western corner of a cemetery in Wiskitki, 150m to the south of the right-of-way boundary (at kilometre 420+650).

5. An area of mown grassland singled out by its diversity situated in the region of Nowy Oryszew and Janówek at kilometre 420+900 in a distance of 400 to 500m.

6. Sites of Large Pink (at kilometre 425+900): part of the site is situated within the road right-of-way, other sites are situated as follows: at kilometre 425+950, approx 150m to the north of the right-of-way boundary; at kilometre 428+450, approx 60m to the north of the right-of-way boundary; and at kilometre 429+800, approx 200m to the north of the right-of-way boundary.

7. Nests of white storks:

- At kilometre 425+750: unoccupied, situated on a platform in a property, 220m to the north of the right-of-way boundary in Holendry Baranowskie Zachodnie;

- At kilometre 426+100: occupied, located on a tree in a property, 200m to the south of the right-of-way boundary in Holendry Baranowskie Zachodnie;

- At kilometre 427+660: occupied, located on a tree next to a property, 340m to the south of the right-of-way boundary in Holendry Baranowskie Zachodnie;

- At kilometre 430+170: occupied, located on a platform in a property, 300m to the south of the right-of-way boundary in Kopiska Duże;

- At kilometre 430+380: unoccupied, located on a black alder tree within the road right-of-way;

- At kilometre 430+550: occupied, located on platform in property no. 37, 100m to the north of the right-of-way boundary in Baranów.

8. Trees that qualify to be classified as natural monuments:

- A Pedunculate Oak tree with a trunk circumference of 319cm (at kilometre 430+450), 240m to the north of the right-of-way boundary in Baranów;

- A Pedunculate Oak tree with a trunk circumference of 319cm (at kilometre 430+450), 75m to the north of the right-of-way boundary in Baranów no 37;

- A European Ash tree with a trunk circumference of 270cm in Nowe Izdebnio (at kilometre 433+200), 20m to the north of a motorway axis, within the road right-of-way. This tree will have to be removed to implement the investment project.

- A European Ash tree with a trunk circumference of 280cm in Dąbrówka (at kilometre 435+400), 250m to the south of the motorway axis. The object is situated right next to the southern right-of-way boundary, which at this point runs far to the south of the motorway axis. This is an endangered object. Whether it will be preserved will depend on how construction works will be carried out.

9. Nests of white storks:

- Occupied, located on a tree next to the buildings in Kotowice Stare (at kilometre 442+200), 400m to the south of the right-of-way boundary.

- Unoccupied, on a poplar next to a property in Adamów (at kilometre 439+650), 50m to the south of the right-of-way boundary.

10. The existing natural monuments:

- A Pedunculate Oak tree (*Quercus robur*) with a trunk circumference of 413cm in Biskupice (at kilometre 444+500) in an old state-owned farm (PGR), 425m to the north of the motorway axis, approx 100m of the nearest right-of-way boundary, which at this point runs far away to the north of the motorway axis along the local road.

The object is located outside the motorway's impact zone.

11. Trees that qualify to be classified as natural monuments:

- A Grey Poplar tree (*Populus x canescens*) with a trunk circumference of 595 growing by a bridge on the Mrowna River in Tłuste (at kilometre 438+450), 125m to the north of the motorway axis, next to the northern right-of-way boundary. It will probably have to be cut down to develop the interchange.

- A Pedunculate Oak tree (*Quercus robur*) with a trunk circumference of 295cm in Adamów (at kilometre 439+380), 80m to the south of the right-of-way boundary. The object is located outside the motorway's impact zone.

- A group of four White Poplar trees (*Populus alba*) with a circumference of 490cm in Biskupice (at kilometre 444+450) in an old state-owned farm (PGR), 400m to the north of the motorway axis, approx 100m of the nearest right-of-way boundary, which at this point runs far to the north of the motorway axis along the local road.

The object is located outside the motorway's impact zone.

12. Nests of white storks:

- An unoccupied platform on a pole on the premises of PGR Koszajec (at kilometre 447+350), approx 50m to the north of the right-of-way boundary.

- Occupied, on a pole next to the building in the village Koszajec (at kilometre 447+800), approx 150m to the south of the right-of-way boundary.

13. A Pedunculate Oak tree with a trunk circumference of 320cm in a cemetery in Pruszków (at kilometre 450+350), 100m to the east and south of the right-of-way boundary. The object is located outside the motorway's impact zone.

14. The existing natural monuments:

- A Small-Leaved Lime (*Tilia cordata*) with a trunk circumference of 460cm in Pruszków, in Żbikowska Street (at kilometre 452-800), 270m to the south of the right-of-way boundary. The object is located outside the motorway's impact zone.

15. Trees that qualify to be classified as natural monuments:

- A Pedunculate Oak tree (*Quercus robur*) with a trunk circumference of approx 300cm in Pruszków, in Żbikowska Street (at kilometre 452+300) in old state-owned farm (PGR), 400m to the south of the motorway axis, 280m of the nearest right-of-way boundary. The object is located outside the motorway's impact zone.

- A group of trees including among others: Silver Maple (*Acer saccharinum*) (a trunk circumference of approx 350cm), European Ash (*Fraxinus excelsior*), Norway Maple (*Acer platanoides*) (at kilometre 452+500), 450m to the south of the motorway axis, approx 400m to the nearest right-of-way boundary (the trees grow in a private property

in Szelągowskiego Street; the trees have not been measured yet). The object is located outside the motorway's impact zone.

2.7. Protected areas

The Bolimów Landscape Park is situated within the region of the planned motorway. The motorway runs along the northern boundary of the Park, from the beginning of the analysed section to kilometre 417+850. The route of the planned motorway will go through the 200m wide park protection zone, which runs along the park boundaries.

The park covers 23 130.11ha; the park protection zone covers 2 940ha.

The park covers a forest complex of the Bolimów Primeval Forests, which is situated between Skierniewice, Łowicz, Bolimów and Żyrardów. These are remnants of the following historical forests: Bolimów, Wistkiki and Jaktorów. The Rawka River passes through the middle of the Bolimów Primeval Forests. It has preserved its natural meandering course of a lowland river, and its valley is an important wildlife corridor. The valley has been protected as a nature reserve and it is planned to include it into the Natura 2000 network (PLH100015 Dolina Rawki).

Forests cover approx 70% of the park. Varieties of pine forests dominate in the park.

The planned motorway runs through two areas of the protected landscape. The first is the area of Bolimów - Radziejów with the valley of the main Rawka. It covers a total of 25 753ha and is situated in municipalities Jaktorów, Mszczonów, Puszcza Mariańska, Radziejowice and Wiskitki. The area is protected for its landscape, which is singled out by diversified ecosystems; it is valuable because it can satisfy tourist needs and function as wildlife corridors.

The Warsaw Protected Landscape Area (Warszawski Obszar Chronionego Krajobrazu) is another area the planned motorway runs through. It crosses this area in the Rokitnica River valley at kilometres 438+800÷438+950 and 40+400÷441+800. The Utrata River valley at kilometres 449+920÷450+000 is the last section the planned A2 motorway runs through the Warsaw Protected Landscape Area. The Protected Landscape Area covers 148 409.1ha in total.

In the first part, the analysed motorway section collides with a fauna migration corridor of regional importance to a seasonal migration of elk from the Kampinos Primeval Forests towards Pilice Forests, the Vistula Valley and the Kozienice Primeval Forests. The regional corridor is also of key importance to migrations of other large ungulates between the regions.

In addition, the analysed motorway section collides with migration corridors of local importance, which are used for seasonal migrations by medium-size ungulates and small mammals from wetlands. The local and regional corridors are connected with river valleys; they are the natural routes animals use to migrate.

The analysed motorway section does not run through the Natura 2000 network areas within the boundaries of the Mazovia Voivodeship; neither the existing, nor the planned ones (including those listed on a so-called Shadow List). The planned motorway does not run in the immediate vicinity of these areas. Dąbrowa Radziejowska (PLH 140003) is the closest located Natura 2000 area within the boundaries of the Mazovia Voivodeship, which is situated approx 13km to the south of the planned motorway at kilometre 430+000.

2.8. Description of the existing historical monuments situated in the immediate vicinity or within the impact zone of the planned project, which are protected pursuant to the regulations on monuments' protection and conservation

36 cultural objects and 46 archaeological sites have been identified within a 1000m wide strip of land (500m on each side of the motorway) in the planned motorway section.

Two manor houses with parks are located in Duchnice and Żukówek. In addition, there is a natural-horticultural complex in Pruszków - Żbików, a church in Żuków, and two chapels in Wiskitki. 6 cemeteries are located in the vicinity of the planned motorway in Baranów, Pruszków-Żbików, Wiskitki, and Żuków. Other cultural objects are mainly roadside crosses and shrines.

Culturally, Wiskitki is of key importance within the analysed section. Three cemeteries located nearby are listed: a parish Roman Catholic cemetery, a Jewish cemetery, and the cemetery of Russian soldiers of WWI. The parish Roman Catholic cemetery has an alley design and dates back to the first half of the eighteenth century. Gravestones date back to the first years of the nineteenth century. The Lubieński's family tomb of 1848 is of historical importance. Historic cemeteries are also located in Baranów and Żuków. The Catholic Roman cemetery in Baranów was founded in 1939. It has alleys; the oldest gravestone comes from 1916. The cemetery in Żuków comes from 1924; it also has an alley design. The cemetery has many gravestones of artistic value from the second half of the nineteenth century. These cemeteries are located in an open-plan area, and for this reason, they are important to the landscape. There are two mounds in Miedniewice, which are the mass graves from WWI. They are located in the open area in the meadows on both sides of the Sucha River.

Żbików is another place of cultural importance. Previously a village, now it is part of Pruszków. The Żbików village settlement was probably established in the twelfth century. From the fifteenth to seventeenth century, it was known as a village of bishops of Poznań. There is a parish Rome Catholic cemetery in Pruszków - Żbików, which neighbours the planned A2 motorway. This cemetery was founded around 1800; it has an alley design. The cemetery has many gravestones produced between the half of the nineteenth century and present. There are many old trees in the cemetery.

The Hoser horticultural complex is another object of cultural value situated in Żbików. Its northern part sits within the motorway route. The object is listed; it is a horticultural complex valued for its architectural-production character, which was established around 1898. The investment project implementation will require building on the part of this listed area.

A wooden church in Żuków is an important object situated within the motorway route. It was built between 1676 and 1677. The church sits on a mild hill surrounded by trees that grow along its brick fence. The object is located approx 80m from the right-of-way boundaries.

Two manor houses with parks are situated in the vicinity of the planned A2 motorway. The first is in Żukówek. It is a wood and brick manor house in the Classicistic style, which is surrounded by the park with rich planting. Another manor house is in Duchnice. It was built in 1968, and is surrounded by the park, which dates back to the end of the nineteenth century. These two manor houses are of key importance to the cultural landscape; they are of the environmental, cultural and landscape value.

There are many shrines and roadside crosses of the value to the landscape that sit along the analysed motorway section.

3. DESCRIPTION OF THE PROJECT OPTIONS

3.1. Option that proposes not to proceed with the project implementation

An analysis of an option that proposes not to proceed with the project implementation describes the situation where the discussed motorway section would not be constructed.

At present, the area sandwiched between the boundary of the Mazovia Voivodeship and Warsaw is connected by the existing road network. National roads No 2, 8 and 50 are the most important roads within this area.

The construction of the motorway within the Mazovia Voivodeship, a section from Stryków (the A2 motorway section, which has been constructed and is operational, reaches Stryków) to Warsaw will considerably decrease a vehicle flow mainly on the national roads No 2 and 8. The traffic prognosis (which takes into account a network of planned roads) shows significant changes in the traffic flow. The option that proposes not to proceed with the construction of this road section can be seen as a source of:

- an increase in traffic on the existing roads. The general traffic flow measured on the national road network during five years from 2000 to 2005 shows that the traffic on national roads increased by 18% on average in Poland, and by 15% in the Mazovia Voivodeship,
- a deterioration in technical condition of the existing roads,
- an increase in discomfort caused by these roads felt by the residents living within their surroundings; difficulties in local transport,
- a deterioration in road safety, in particular within the built-up areas where the existing roads run,
- the existing roads are not sufficiently equipped to protect the environment.

The effects of not proceeding with the construction of the planned section for particular elements of the environment and the environment as a whole are described below.

Noise

An analysis of the prognoses developed to assess the environmental impact of sections of the existing national roads No 2 and 8 leads to a conclusion that the A2 construction will improve the acoustic environment within these roads' surroundings, in sections between Łódź and Warsaw. The motorway will take a considerable part of traffic, which at present continues to flow these roads. It will directly translate into a drop in a noise level within the neighbouring areas. An analysis of an equal loudness contour of noise limit values shows that a drop in traffic during the motorway operation will lead to a decrease in its impact zone. In 2025, the difference can reach approx 27 to 42% for national road No 2, and approx 13 to 15% for national road No 8. However, it must be said that the motorway construction will deteriorate the acoustic environment within the inhabited areas situated in its vicinity. The residential areas can be covered by a zone with exceedances of noise limit values, which will require the introduction of the protection against noise e.g. noise barriers.

The newly planned road will take the considerable part of heavy load vehicle traffic, which determines noise levels at particular route sections. A traffic diversion and locating it in a significant distance to densely built-up towns of Błonie and Ożarów Mazowiecki will reduce a number of residents exposed to excessive noise. The residents of Grodzisk Mazowiecki, Milanówek and Brwinów can expect that local transport will improve, because it is possible that the voivodeship road No 719 will relieve traffic. If the investment is stopped, an increase in traffic on the existing roads will increase the noise emission, and the zone of their negative effects will cover the larger part of housing estates located along the existing roads No 2 and 8. The analyses show that the particularly adverse effects will occur along the national road No 8, where the exceedance of night-time noise limits will increase by 30% between 2010 and 2025.

Air

The A2 section from the boundaries of the Łódź and Mazovia Voivodeships to Konotopa will ease the traffic on the main national roads No 2 and 8. The concentration of air pollutants on these national roads will drop as a result of the construction of the A2. If the investment is stopped, an increase in traffic will increase the exhaust emission, which will affect the densely built-up areas along the existing roads.

The natural environment

The effects of not proceeding with the construction of the motorway section can be analysed in terms of a local impact (the motorway location) and in a broader context.

In terms of its local impact, the motorway construction will require approx 684ha of land, which until now has been used for agricultural purposes and partly developed. In this option, these areas will continue to be used for the same purposes. Hence, from this point of view, the motorway construction can be considered to decrease the biologically active area.

The short sections of the motorway will run through the forest complexes, which will lead to their separation, and bring about a so-called edge effect, which may affect the forest stand and encourage unwanted effects (windfalls, or growth of invasive species). If the road runs through the forest complex, its microclimate change must be taken into account: the air and light penetrate the forest to a greater extent, which causes moisture to drop and temperature to rise. Organisms such as moss and lichen can react to these conditions first. Changes to the way animals are located within the forest environment are usually observed within a strip, which is several dozen (at least approx 30) metres wide.

The motorway will influence the fauna: some bird species (especially in wetlands) can lose their feeding habitats and leave the vicinity of the motorway. Collisions of cars and birds or small mammals can attract predators interested in easy prey (carrion).

These are the negative effects that can be expected to occur in the vicinity of the motorway location.

The necessary mitigating measures, which have been described in the Environmental Impact Assessment, will reduce these adverse effects (preservation of continuity of migration corridors, protection of forests); however, they will not eradicate them completely.

On the other hand, if the motorway construction is stopped, the barrier effect on the existing road network will be maintained, and with the predicted traffic increase, this effect will worsen.

The option that proposes not to proceed with the motorway construction would be the best option locally (in its location), perceived in terms of the protection of the local environment. Approx 684ha of land would be saved, which would preserve the acoustic comfort the residents of the areas adjoining the planned motorway have had so far. It would assure an undisturbed existence of fauna species and remove risks posed by the motorway construction to two listed objects (the cemetery and the horticultural farm of the architectural-production character in Pruszków).

However, the broad perspective allows seeing the impacts of the existing and planned roads and the benefits of the motorway construction, also in terms of the environment protection:

- The discomfort caused by the roads with heavy traffic will be reduced.
- The acoustic environment will improve in towns, which at present experience effects of heavy traffic flowing the national (e.g. No 2 runs through Błonie and Ożarów Mazowiecki) and voivodeship roads (e.g. No 719 runs through Grodzisk Mazowiecki, Milanówek and Brwinów). At present, the residents experience a significant improvement of local transport.
- In comparison with the existing roads that have no protection systems, the motorway will pose a smaller threat to the environment, because of the environment protection systems that will be constructed (barriers, animal corridors, insulation).

3.2. Implementation options

Pursuant to Article 52(1)(d) of the Act on Environment Protection Law, road construction projects, for which decisions regarding their locations have been issued, do not require submission of other location options.

The location of the A2 motorway has been determined by the Mazovia Voivode in the following decisions that were issued in 2005:

- No 1538/05, ref WRR.II-7047-D/11/05 of 14 July 2005 concerning the location of the A2 toll motorway, section I from the boundary of the Łódź Voivodeship to Wiskitki Interchange.
- No 2150/05, ref WRR.II-7047-D/39/05 of 25/10/2005 concerning the location of the A2 toll motorway, section II from town Wiskitki (Interchange Wiskitki) to town Grodzisk Mazowiecki (Interchange Tłuste), from kilometre 420+710.00 to kilometre 439+230.00).
- No 2163/05, ref WRR.II-7047-D/157/05 of 26/10/2005 concerning the location of the A2 toll motorway, section III from Interchange Tłuste (town Grodzisk Mazowiecki) to Pruszków Interchange (town Pruszków), from kilometre 439+230.00 to kilometre 451+460.75.
- No 2501/05, ref WRR.II-7047-D/158/05 of 15/11/2005 concerning the location of the A2 toll motorway, section IV running through the Mazovia Voivodeship, from Pruszków Interchange to Konotopa Interchange, from kilometre 451+460.75 to kilometre 456+239.67.

Taking the above into account, no other location options have been analysed within the framework of the Environmental Impact Assessment.

4. PREDICTED EFFECTS ON THE ENVIRONMENT

4.1. Effects on the land surface and soil

Works related to the route construction will:

- remove the surface layer of fertile soil;
- spoil the land surface because of earthworks;
- cause a possible, short-term and temporary lowering of a groundwater table caused by a necessity to build suitable drainage, which is required if the non-load bearing soil has to be replaced;
- produce solid waste and small quantities of wastewater.

The construction works will affect the soil briefly and temporarily (with the exception of a permanent use of a strip of land to build the motorway and road structures). A direct impact on the land surface and soil during the road construction will be local. The soil will be completely damaged during the construction in the areas freshly occupied to house the road, and, to a larger extent, in the vicinity of interchanges and areas housing road drainage systems. The area occupied by farmlands will slightly decrease due to construction works. Earthworks will cause damage to the natural environment in areas allocated for cuttings and spoils within and in the vicinity of a road right-of-way, which is required to construct e.g. the road structure. The area of approx 690ha will be permanently occupied and transformed.

It is predicted that large soil transfers and deep cuttings (apart from sections that will require replacing the non-load bearing soil) will not be necessary on the discussed road section because of small height differences and the motorway running on small embankments (they are higher locally in the vicinity of the structures).

Soil contamination around roads occurs mainly because the particles that contain substances emitted into the air by travelling vehicles settle on the soil surface. Apart from the exhaust emissions, motor traffic pollutes the environment with carbon black dust produced during the car's tyre wear. In addition, road surfaces, which are formed of various materials, undergo abrasion processes.

The effects of soil contamination caused by traffic become visible many years after the road has been used. The largest and the most dangerous are surface deposits of heavy metals, in particular the compounds of lead, zinc, copper and cadmium. The soil acidification processes develop gradually with time. However, the contamination of soil with lead will be marginal because the lead-free petrol and catalytic converters are now commonly used.

The soil in the vicinity of roads is also threatened by acidification caused by their maintenance in winter.

The quantities of contaminates that affect the soil surface tend to drop because the technical condition of vehicles continues to improve and because the lead-free petrol is used. The proposed water discharge and treatment systems for water flowing down the road surface will limit the negative effects the road will have on the land surface and soil.

4.2. Effects on the surface water and groundwater

The construction of the motorway section is a potential source of negative effects on the water environment: the water regime and the surface water contamination. It can disturb the surface flow in the neighbouring areas and deteriorate the surface water quality locally and temporarily.

Works related to the construction of road structures and technical infrastructure equipment, piling during the construction of road structures, and regulation of the water regime in the vicinity of the route (regulation and relocation of watercourses, construction of culverts, bridges, etc.) can change the water regime.

Small watercourses and the land that underwent hydrological improvements are the most susceptible to changes in the water regime.

All works related to the road construction also pose threat to the water quality, which can be caused by:

- a listing caused by the soil erosion during the road construction (the erosion damage usually occurs in embankment, cut slopes, and ditches and in their vicinity);
- a discharge of untreated human sewage and technological solid waste from various facilities in the construction camp.
- washing out dangerous compounds from materials used to construct the road (e.g. blast furnace slag and bituminous substances);
- a discharge of considerable quantities of suspended solids (cement, limestone dust, etc.) from the construction site to the surface water;
- a discharge of petroleum products from construction machinery and means of transport to the water.

Works related to the motorway construction will:

- produce various solid waste and wastewater (mostly sanitary),
- spoil the land surface due to earthworks during the construction of the road and, e.g., embankments, cuts, flyovers and bridges,
- cause a possible, short-term and temporary lowering of the groundwater table caused by a necessity to build suitable drainage (e.g. when the non-load bearing soil is replaced).

The present information on hydrogeological conditions and technical solutions suggest that it probably will not be necessary to run the drainage system. However, the geotechnical conditions and the final construction solutions have not been determined. Hence, it will be possible to determine places which will require the drainage system

only after the detailed geological and engineering examination and when the construction works technology is selected.

The construction works will affect the soil briefly and temporarily (with the exception of the permanent use of the strip of land to build the motorway); this will not lead to changes to the water regime within the area.

Contamination from splashing, rainwater and melt water flows from the road surface and drops of substances dangerous to the environment in case of a serious accident are the source of direct adverse effects on the surface water and indirect effects on groundwater during the road operation. Rainwater flows can be heavily contaminated, in particular after long dry-weather periods or snow covers (pollutants and substances used to maintain roads in winter cumulate), and also in the case of serious accidents related to toxic substance spills.

These pollutants can infiltrate and reach the shallow groundwater and deep groundwater.

The route can have impact on the following water intake structures located in the vicinity:

1. At kilometre 418+800 of the route in Starowiskitki. The route runs several metres from the intake. A potential threat to an aquifer is insignificant, because it is well protected by a confining layer. An immediate protection zone (8m from a well) must be properly secured during the construction works.
2. At kilometre 420+550: a plant water intake structure in Wiskitki located over 200m from the motorway which is quite well protected by a confining layer. A protection zone has not been determined for this well, because the migration time of contaminants from the land surface to the aquifer has been estimated for approx 25 years. The migration directs towards the north, and so, from the well towards the motorway. For this reason, there seems to be no threat to this water intake structure.
3. At kilometre 425+000 of the route in Feliksów. This water intake structure is located approx 900m from the route. The boundary of the protection zone runs 350m from the route. This intake provides water to a considerable area near Wiskitki and Żyradrów. The motorway runs through a resource area that supplies a complex of intakes in the region of Żyradrów (in e.g. Feliksów, Nowy Kozłów and Stanisławów – Baranów). Despite quite a good protection by a confining layer, it cannot be excluded that there are less well protected aquifer parts between the intake and the motorway.
4. At kilometre 427+200 of the route in Holendry Baranowskie: an intake in the old OTM, which is poorly isolated from the land surface. The water quality in this intake can be threatened with infiltration by contaminants flowing down the road and the services, which is caused by the groundwater flow direction and its distance to the motorway. It requires the additional protection against the potential groundwater infiltration by contaminants (if a well is still used, e.g. by the services), or closing the well.
5. At kilometre 434+300 in Zabłotnia: there is an insignificant threat to the intake because it is well protected by a confining layer and situated in a distance to the motorway (approx 800m).
6. At kilometres 435+400 to 435+800 in Dąbrówka; at present wells extract water from the Oligocene aquifer (the wells that extract water from the quaternary level have been closed). These intakes are not threatened by the motorway, because they are very well protected by confining layers of the Oligocene level.
7. At kilometre 439+400: the Henryków Brickyard, a plant intake which does not extract much water. There is an insignificant threat to this intake, because it is very well protected by a confining layer. A potential threat can arise if the surface water in clay pit ponds around the brickyard is contaminated.
8. At kilometre 444+700 in Brwinów. Like in the above case, a well can be threatened if the surface water in the neighbouring clay pit ponds is contaminated.
9. From kilometre 447+000 to the end of the project: many individual and plant water intake structures and sprinkling machines. There are many private (individual) water intake structures that reach groundwater 25 to 30m deep, and a few plant intakes: e.g. Daewoo Sp z o.o. in Pruszków, RSP Koszajec, Moszna Heat and Power Plant (it is planned to close the wells), schools in Koszajec and Moszna, and RSP Duchnice. Because this aquifer has no confining layer, the analysed route is a potential threat to the quality of water in these intakes, which requires the additional protection against the possible infiltration with contaminated water flowing down the motorway during both the routine use of the road and potential accidents.

Wastewater discharged to water or soil may not contain solid waste and flowing contaminants and cause changes to these waters: changes in their natural biotic community, turbidity, colour and odour; also, the discharge may not cause forming sludge or foam. The legislation, i.e. the Regulation concerning conditions that must be satisfied to discharge wastewater to water or soil and substances particularly harmful to the aquatic environment, determine requirements for rainwater and melt water only for:

- total suspended solids 100 g/m³
- petroleum hydrocarbons 15 g/m³

Concentration of contaminants in rainwater runoffs depends on many factors such as the motor traffic flow, technical condition of vehicles, land development, climate conditions and the width of the drained road crown.

Based on the data analysis, it can be concluded that the predicted concentration of contaminants in wastewater will be lower in 2025 than in 2010, because of the target cross-section accepted for the motorway for 2025 (the motorway will have two three-lane roadways, and two four-lane roadways in the section from Pruszków to Konotopa). In this assumption, the sealed area from which wastewater is discharged is considerably larger, and therefore there is a greater volume of rainwater, in which contaminants dilute.

Total suspended solids

It may be concluded that exceedances of allowable contaminant concentrations in wastewater total suspended solids will occur.

Petroleum hydrocarbons

It may be concluded that the contamination of rainwater flowing down the road surface with petroleum hydrocarbons will be insignificant.

4.3. Effects on the acoustic environment

The adverse acoustic conditions will occur during construction works on the site and its surroundings. These effects can lead to the noise increase, because heavy machines used to construct the motorway will produce high sound levels. Construction works will require concentrating many such noise sources on a relatively short section. The movement of heavy load vehicles transporting loads and materials will have negative effects on the acoustic environment around the construction site. The noise produced during construction works will be temporary and reversible. It will be characterised by a significant dynamics of changes. All buildings located along the planned investment, close to the roadway edge, will be temporarily affected by sound levels.

It is predicted that the construction of the motorway and the adjoining infrastructure (viaducts, road relocations, interchanges and slip roads) will have the strongest negative effects on people at the implementation stage in terms of noise. The last section of the analysed motorway is located in a densely built-up area (Brwinów, Pruszków and Piastów), where a significant number of residents living in the immediate surroundings of the investment will be exposed to such impacts.

It will be necessary to connect the buildings and agricultural land situated on both sides of the motorway within the framework of the planned investment. It is planned to build several dozen viaducts, four interchanges, and modernize or relocate the voivodeship, district and municipal roads.

These roads, viaducts and interchanges will be constructed within minimum 4m from the residential buildings. The noise will certainly impact on the residents of buildings situated in the vicinity of construction works. It is important to carry out these works daytime only and within the shortest time possible.

Operating the motorway

The planned motorway mainly runs through the areas with dispersed farmsteads, residential dwellings and services, and single- and multifamily housing (picture 4.1). The acoustic environment in the vicinity of the housing can be expected to deteriorate after the motorway is constructed. However, it must be stressed that the acoustic environment in the areas neighbouring the national road No 2 and 8, in sections that parallel the planned motorway, which at present reach high sound levels, will improve because the motorway will take part of traffic. The equivalent sound levels have been predicted for the purposes of the environmental impact assessment to determine the acoustic environment on completion and during the operation of the planned A2 motorway section (section from the boundary of the Łódź / Mazovia Voivodeship to Konotopa Interchange). They take into account the motorway location and the landform (including earth embankments, which are proposed to act as the protection against noise). They have been predicted for the following time horizons:

- 2010 – on completion of the A2 motorway
- 2025 – 15 years after completion of the A2 motorway



Picture 4.1 Multifamily housing located in the areas in the vicinity of the planned motorway

The analyses assumed the following values for the equivalent sound level for the areas located in the vicinity of the planned A2 motorway (in accordance with the regulation in force concerning the noise limit values in the environment):

- daytime (6am to 10pm): 60 dB,
- night-time (10pm to 6am): 50 dB,

Analyses of equal loudness contours show that in the vicinity of the motorway, the section from Konotopa Interchange to Tłuste Interchange, a daytime equal loudness contour 55dB, which is a noise limit value for the single-family housing reaches further than a night-time equal loudness contour 50dB. This determined where the single-family housing has been located in the discussed motorway section based on the documentation from local authorities. The protection proposed for these areas is based on the equal loudness contour 55dB. The daytime, 55dB, and night-time, 50dB, equal loudness contours are the same for other sections. In this case, the night-time equal loudness contour 50dB was used to analyse the noise zone and propose protection.

The following noise limit values have been determined for the single-family housing for the Tłuste – Konotopa section:

- daytime (6am to 10pm): 55dB,
- night-time (10pm to 6am): 50dB,

The single-family housing areas have been shown in the Annex.

The acoustic environment will deteriorate in the areas neighbouring the planned motorway. The zones of exceedances of limit values of the daytime equivalent sound level in these areas in 2010 will reach 180 to 190m in the open area for a limit value of 60dB and approx 330m for 55dB (area of single-family housing), and the night-time approx 330m. They will increase in 2025 because of the traffic increase and will reach approx 200 to 225m for a limit value of 60dB and approx 360 for 55dB daytime, and approx 360m night-time. Because of this, the exceedances of limit values for equivalent sound level in 2010 will cover 199, and in 2025 approx 231 residential buildings.

4.4. Effects on the free air

The movement of vehicles and the use of heavy machinery will produce pollutants that will be emitted to the air during the investment project implementation. The technology of construction works (among other things) will determine the quantities of emitted pollution. The reconstruction will require using machinery such as milling machines, rippers, loaders, vehicles transporting building materials, vibratory and static road rollers, and many other machine types. The time of operating the machines and the number of machines and equipment used will change depending on how the construction works will advance. Therefore, the length of time they will impact on the quality of free air, i.e. emit gas pollutants (mainly nitric oxide and sulphur dioxide), dust and heavy metals in dust will change. These effects will be short-term and reversible (depending on how much time the construction works will take). The direct effects, in particular of the dust pollution, will affect buildings located by the road and the natural and cultivated vegetation.

Dusting caused by the works in the vicinity of the monuments will pose a particular threat. The following objects, which are located in the close vicinity of the planned construction site, are the most threatened with such negative impacts:

- At kilometre 450+100: the parish cemetery in Pruszków - Żbików,
- At kilometre 452+750: the Hoser horticultural complex.

Both objects are situated approx 10m from the area where the works related to the roadway construction will take place.

Based on an analysis of the prognoses developed for the purposes of the environmental assessment impact, it has been concluded that a possible exceedance of a reference level for nitric oxide will be a key problem during the operation of the A2 motorway. The prognoses show that exceedances of NO₂ limit values will occur along the whole planned A2 motorway section (from the boundary of the Łódź / Mazovia Voivodeship to Konotopa Interchange) both in 2010 and 2025.

The greatest exceedance of the limit value for nitrogen dioxide will occur in the Pruszków – Konotopa section in 2025. The maximum zone of exceedances of limit values for this substance will reach approx 4m from the road axis in this section.

The analyses show that exceedance for sulphur dioxide can also occur. In terms of protection of vegetation, the exceedances will occur in all analysed sections in 2010 and 2025, except for the section Wiskitki – Tłuste in 2010.

In terms of human health protection, the limit value for sulphur dioxide will be exceeded in the section Pruszków – Konotopa in 2025, and this is the greatest exceedance for this substance.

The maximum zone of exceedances of limit values for this substance will reach approx 13m from the road axis in this section, which makes it fit between the right-of-way boundaries.

In addition, the limit value for benzene can be exceeded in 2010 in the Konotopa Interchange.

The values for other substances do not exceed limit values.

4.5. Effects on the living nature

The implementation of the investment project will require taking the land: a layer of soil will be removed, and masses of earth transferred and compacted. The construction phase will be a temporary blot on the landscape, including the protected landscape areas.

The impact of the A2 motorway construction on plants and natural habitats will be diversified depending on the procedures selected to construct the motorway.

The impact on habitats will be limited in sections where the road will be constructed on bridges and flyovers. Part of habitats will be destructed during the construction, but they will be regenerated in natural succession in the majority of the area. It mostly applies to agricultural lands.

The effects on habitats will be radical in sections where the road will be constructed on embankments and in cuts (a very short section). The surface earth layer (soil and vegetation creating habitats) will be removed from the planned, at least 150m wide strip (up to maximum 1100m in the vicinity of interchanges). In terms of the natural environment, the effects of removing the soil and vegetation will be moderate because almost the whole route runs through the agricultural land (arable land, meadows).

The impact on flora, like the impact on habitats, will be radical within the road right-of-way, which means the vegetation growing within this strip of land will be destroyed. The materials necessary to build the motorway should be transported using the existing roads or within the delimited road right-of-way in order not to destroy habitats and groups of plants growing outside delimited areas, in particular in areas of the higher environmental value.

The flora on the land, which will be occupied by the construction temporarily, will regenerate in the natural succession provided that the subsoil will not be transformed too dramatically.

The field work concerning collecting the information about the natural environment condition described in 2.6, 'Living nature and land development in the vicinity of the planned motorway', shows that the following protected plant species will be destroyed:

- From kilometre 411+465 to kilometre 414+000 within the road right-of-way: habitats of Dwarf Everlast situated in the sandy uncultivated land, which is a partly protected species,

- Sites of Large Pink (at kilometre 425+900): part of the site located within the road right-of-way boundaries.

The following areas and objects of the environmental value (not legally protected) will have to be destroyed in the construction phase:

- Two areas of the environmental value located from kilometre 425+550 to 426+400 and from kilometre 428+800 to 429+900 of the motorway route. Both areas are the most valuable in the whole project, because of the wet meadow complexes singled out by their biological diversity (flora in particular) and an unusual landscape value.

- A European Ash tree with a trunk circumference of 270cm in Nowe Izdebno (at kilometre 433+200), within the road right-of-way. The tree will be removed because of the project implementation.

- A Grey Poplar with a trunk circumference of 595 growing next to the Mrowna River in Tłuste (at kilometre 438+400), which neighbours the northern right-of-way boundary. The interchange development will lead to its cutting down.

The sites of protected or valuable plants situated outside the road right-of-way, but in its immediate vicinity can be potentially affected:

- A complex of wet meadows with willow brush located in the Sucha Nida valley to the south of the road right-of-way (from kilometre 417+500 to kilometre 417+700),

- Individual sites of Common Centaury located in dry meadows, approx 10 to 30 metres to the south of the right-of-way boundary (at kilometre 414+550). The implementation of the investment project can partially destruct the site of this species, mainly due to the physical damage during the motorway contraction or the change in the water regime.

- Sites of large pink: part of the site is situated at kilometre 425+900, approx 150m to the north of the right-of-way boundary; another part is situated at kilometre 428-450, approx 60m to the north of the right-of-way boundary.

- A European Ash tree with a trunk circumference of 280m in Dąbrówka (at kilometre 435+350). The object is situated right next to the southern right-of-way boundary, which at this point runs far away to the south of the motorway axis. This is an endangered object. Its preservation will depend on how the construction work will be carried out.

The planned motorway runs mainly through fields and meadows, where various animal groups (both mammals and birds, reptiles, amphibians, and invertebrates) live and feed. Field hedges and bushes are the refuge for small birds and mammals. The implementation of the investment project will destruct some habitats. The planned motorway will run through the areas, which are the sanctuaries for animals such as roe deer, hare, pheasant, or partridge. The motorway construction will destruct the field bushes and trees, which are nesting habitats for many species. As a result, the biological diversity of the surrounding areas will decrease.

The impact on animal habitats (small animals and invertebrates in particular) situated within the motorway route will be irreversible. The area of approx 690ha will be occupied and transformed because of the motorway construction.

The implementation of the investment project will bring on an increased movement of heavy machinery, and, related to it, an increase in noise levels in the area. It will scare animals, which will probably move farther away for this time.

There are 12 nests of white storks within a 1000m strip along the planned motorway. These birds have been living around human dwellings for centuries.

Eight nests are situated 100 to 500 metres to the right-of-way boundaries. In this case, if nobody scares the birds (approaches the nests) or drives heavy machinery within the nesting area, the motorway construction and its later operation will not be a problem for the white storks.

The quality of habitats in an immediate vicinity of the operated motorway will be affected by the following:

- air pollution,
- rainwater and melt water pollution,
- soil contamination,
- noise.

The analyses and modelling prepared for the assessment purposes show that noise will have the greatest impact on the surrounding areas.

The environmental impact assessment has been based on the Dutch experience, because there are no studies assessing the noise impact on species (birds in particular) in Poland.

These studies show that the negative impact for the majority of species in open space habitats starts at a sound level of 50dB and 40dB for forest habitats. Any increase above this sound level causes the bird populations living within the road surroundings drop in numbers.

Noise models have been prepared to determine whether the areas of bird habitats counted during on-site visits will be covered by the zone of considerably negative effects of the planned investment. The analyses show the impact zone for 50dB and 60dB equal loudness contours for the heaviest daytime traffic.

According to the assumptions, the 50dB daytime equal loudness contour determines the zone of maximum impact on populations of the analysed species. The 60dB equal loudness contour delimits a strip of land (from the motorway) where the bird population clearly drops by 50% (they abandon their nests and avoid this area). Table 4.1 shows the noise impact. White Stork, Black-headed Gull and Mallard have been excluded from the analyses, because these species are quite used to human presence and activities.

Table 4.1 Noise impact on the species counted

Approximate habitat location	Distance to roadway	Species	Daytime 60dB equal loudness contour for open areas from 2010 to 2025	Predicted impact
417+550	200m	Crane	150-170m	Insignificant change to feeding habitats
420+900	400m	Northern Lapwing	155-175m	No impact
		Common Sandpiper		
		Common Snipe		
		Black-tailed Godwit		
429+650	400m	Crane	155-175m	Some feeding habitats lost. Considerable area remains untouched, no significant impact.
		Northern Lapwing		
429+700	250m	Northern Lapwing	155-175m	
429+800	400m	Common Buzzard	155-175m	No noise impact
431+100	300m	Crane	155-175m	Loss of feeding habitats
431+600	250m	Northern Lapwing	155-175m	No impact
432+150	150m	Common Buzzard	155-175m	Insignificant reduction in feeding habitats. No noise impact.
439+000	300m	Marsh Harrier	175-220m	No impact. Insignificant reduction in feeding habitats. Impact decreased by a noise barrier, which is proposed to be erected to protect the housing estate.
		Eurasian Coot		
446+000	400-500m	Eurasian Coot	175-220m	No impact
		Great Crested Grebe		
		Eurasian Bittern		
		Thrush Nightingale		

On the analysis of the effects the motorway will have on the birds living in the surroundings, it must be concluded that the motorway will permanently take some feeding habitats of Northern Lapwing and Crane. In addition, at the beginning of the motorway operation, these (and other) species will avoid frequent approaches to the investment for less than approx 150 to 200m to the roadway edge. It can be expected that these species will get used to the motorway to some extent in the following years. Common Buzzard will probably adapt the quickest; it will enjoy using poles and a nest spread between them to look for prey in the neighbouring areas including dead small animals and birds that collided with cars. Such behaviour can cause accidents.

The loss of living and feeding habitats of the field and meadow birds will have a negative impact on their populations. There are large areas with similar use structure along the whole analysed investment project. Linear investments in operation have the strongest impact on the environment. In the case of motorways, this is the strongest impact possible, because these roads are separated along their whole length (except for exits and interchanges). This results in a complete separation of animal populations, which brings migrations to a complete stop. Ensuring animal migrations is very important for many reasons. A barrier, which a road is, has a negative effect on many aspects of animal lives.

A barrier such as a fast road can contribute to a decrease in the number of animals, which is caused by lower procreation caused by no or difficult access to breeding habitats or partners. The difficult access to feeding habitats can also affect the condition of the population.

4.6. Effects on the landscape

The short-term impact on the landscape during the implementation will be related to:

- constructing a new road in the areas, which have been used differently until now,
- removing fragments of woodlands, trees and bushes, which have been part of the landscape,
- using the neighbouring areas as access roads and construction sites – temporarily,
- an increased movement of vehicles and heavy construction machinery.



Picture 4.2 Examples of road construction phases in an open landscape

The impact on the landscape and recreation during the motorway operation will be long-term and direct.

A new road corridor has been delimited for the analysed motorway; therefore its use will be a completely new spatial element within the surroundings. The greatest exposure will occur in the vicinity of the planned motorway service structures: services, highway maintenance sections, toll plazas and toll points.

How the road will be seen in terms of the landscape will depend on the landscape type, technical solutions (road grade line in relation to the existing land), and the existing and planned use of land in the immediate vicinity of the planned road.

The impact of the planned road has been analysed in terms of areas (how the road will be seen from a larger distance within the context of the landscape type), and locally (how the road will be seen from a short distance within the context of the local landscape units).

The impact of the planned investment project (including the proposed noise barriers) on the landscape has been assessed in relation to other, already completed structures similar in terms of land development.

It has been recognised that the spatial elements, which can be integrated into the surroundings, have a significant impact on the landscape.

The impact of the planned road onto the landscape has been described below.

The woodland landscape which is similar to the natural landscape is quite limited in terms of the visibility range, because of bushes in the underbrush and the tree undergrowth. Forest meadows and glades, and forest roads create landscape units.



Picture 4.3 Visibility in forests is limited due to narrow and short slots along the roads

The planned road will not be well-visible (despite the fragment, which will be carried by a viaduct) from the depth of the forest and the areas situated behind the forest complexes, which is caused by a limited field of view in woodlands. In this context, it will have an insignificant impact on the landscape.

Cutting down woodland areas to run the road will introduce a local, but permanent change to the landscape similar to the natural landscape. Running the road through the forests will open up the forest. It can lead to tree breaks, in particular high pine trees, which are not adapted to wind. The landscape along the planned road will transform into an anthropogenic landscape.

The farm and woodland landscape is characterised by many landscape units composed of fragments of forests and field hedges. These areas are characterised by fast natural succession.



Picture 4.4 Visibility in an agricultural-woodland landscape is based on walls of landscape units

The planned road will not be well-visible in such a landscape, because of many visually enclosed areas.

When a planned road runs through a landscape unit, it creates two smaller landscape units. It will have no impact onto the landscape character.

The landscape of overgrowing meadows is characterised by narrow lines of hedges on the horizon, which are visible from a distance.



Picture 4.5 Landscape of overgrowing meadows

The road running in such a landscape is visible through a screen of young trees. It blends into the landscape after a few years.

The agricultural landscape is completely open; the visual enclosures are based on field hedges and the green areas surrounding the buildings.



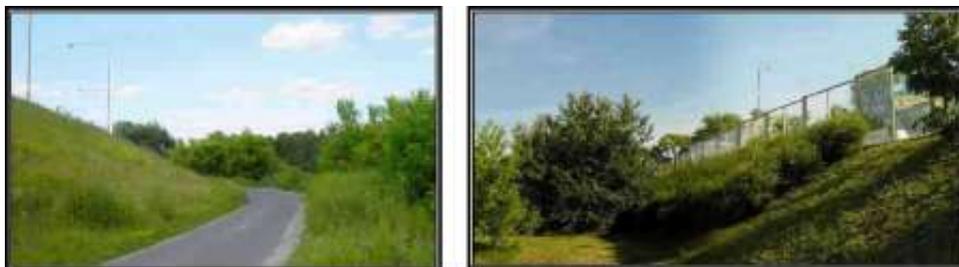
Picture 4.6 Wide visual openings in the agricultural landscape

The road which runs at the ground level is well integrated into the agricultural landscape. Bridges and their access will be the best visible road element in this case. Integrating bridges into the landscape to a large extent depends on their colours. It is the same on the sections that run on embankments. The motorway will run through the vista in such places.



Picture 4.7 Road running in a cut is not visible from the neighbouring areas. In addition, this solution allows to significantly lower embankments that approach an overpass.

Because of the open character of the agricultural landscape, the motorway will signify its presence in sections running on high embankments.



Picture 4.8 Examples of a road running on an approx 6m embankment; bushes and trees grow at its toe

The landscape of suburban and village settlements is created by one- or two-storey buildings.

The vegetation around the buildings to an extent blend them into the surroundings and at the same time visually separate them from the neighbouring areas. The visual openings are most common along the axes of the existing roads and undeveloped gaps between the built-up areas.

The aspect of key importance in the built-up areas is to protect people against negative effects roads have on human health and life. The protection solutions will visually separate the planned motorway from the built-up areas using either noise barriers, earth embankments, or completely hiding it in cuts.

Because of a limited accessibility of the motorway, its fencing and heavy traffic, the road operation will divide the settlement areas. The areas separated by the road will be connected above or underneath the structures located along the planned motorway. The majority of local roads running perpendicular to the planned route will be visually obstructed.

The loss in landscape can be compensated by the cultural landscape if the attractive green areas are developed along the planned investment project. These could be e.g. green belts.



Picture 4.9 Example of integrating a road into the cultural landscape (single-family housing on the left, the road is on the right hidden behind the barriers)

The degraded cultural landscape occurs in areas which have been heavily invested into because of urbanisation. The natural areas in such a landscape are completely transformed by human activity.

The existing traffic routes with their usual development types (services, commercial and industrial developments, warehouses), multifamily housing and the surroundings of power lines comprise this landscape type in the vicinity of the motorway.

The road construction in this landscape will accelerate transformations leading to further urbanisation.

4.7. Effects on the protected areas determined in separate regulations

The motorway does not collide with the protected water intake structures.

The route runs through the area of the Main Groundwater Basin MGB 215 A Warsaw Sub-basin. This basin is separated from the land surface by a thick stratum of Pliocene clay which very well protects this aquifer. Therefore, it is predicted that the motorway will have no negative effects on the MGB.

From the areas protected pursuant to separate regulations, the Bolimów Landscape Park (situated along the motorway, to the south of the motorway for approx 6.2km in the Mazovia Voivodeship) is threatened with the motorway impact.

The revised park protection plan take into account the A2 motorway.

In terms of the park protection, the motorway can impact the park through:

- Degradation or decrease in resistance to degradation of surface water ecosystems, including worsening of quantitative and qualitative characteristics of surface water resources, and modification of natural process that form their quantities and qualities.
- Degradation of native plant species in their natural and semi-natural sites – the motorway can act as a migration route for growth of invasive species.
- Disturbances at movement of individuals: a barrier effect between the meta-populations of particular species, which can have negative effects on preservation of the biological diversity of species.

4.8. Effects on the protected cultural goods

From the listed objects, one is directly threatened by the investment project implementation: a horticultural complex in Pruszków valued for its architectural-production character (listed as No 1500-A), its brick fence in particular.

The picture below shows the location of the roadway, its central reservation, and the boundaries of the listed object.



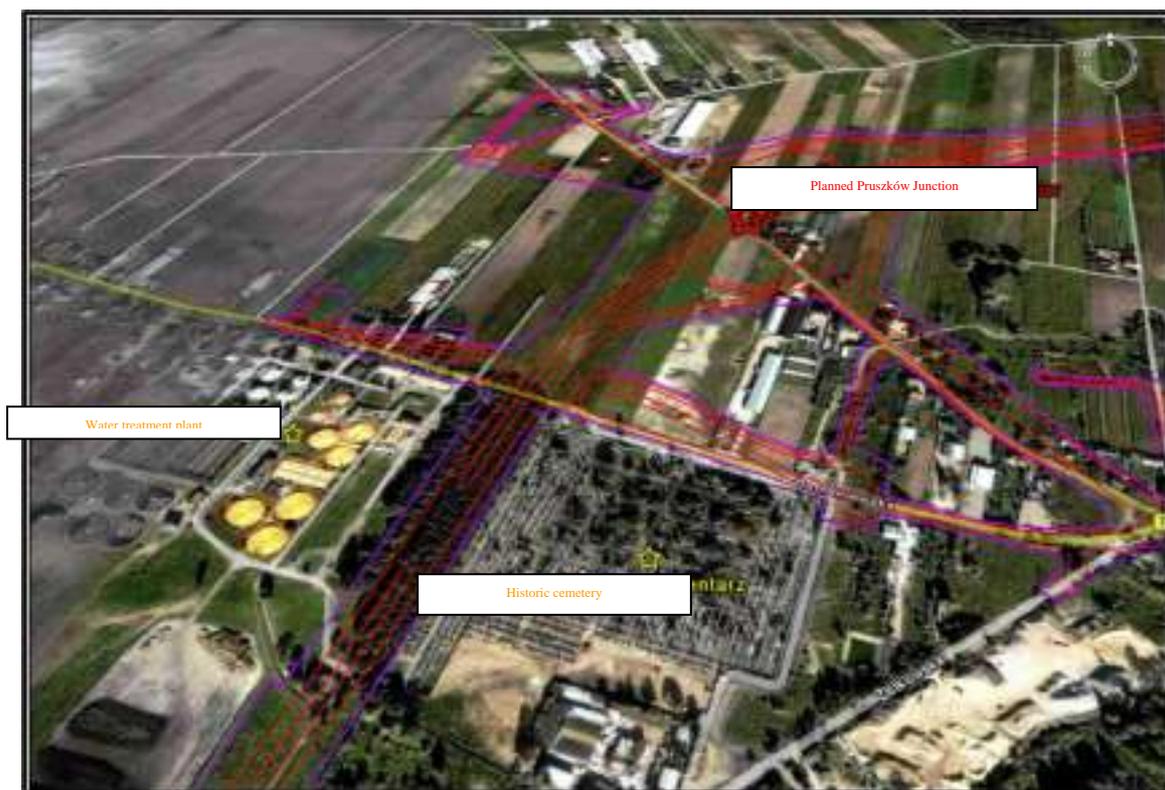
Picture 4.1 Location of historic objects in the Hoser horticultural complex

The edge of a right roadway will run approx 10 to 11m from the historic wall when the motorway is completed. Part of lot no 119 (119/1), region Pruszków 03, which is outside the property fencing will have to be used to implement the investment project. Because of the close location of the motorway to this wall, if there is no protection, there is a high probability that the construction and operation of the motorway can damage part of the wall in the immediate vicinity of the planned road (vibrations). It is also possible that the object can be damaged mechanically, e.g. by the equipment working nearby.

The object will be threatened with the noise impact and air pollution. Along with gas emissions (nitric oxide, sulphur dioxide and other), dust emissions (both during the construction and operation) will occur. Their long-term combination can have a negative effect on the arboretum trees and other plants growing in the historic garden. Computations of locations of concentrations of pollutants indicate possible exceedances of limit values for nitrogen dioxide and sulphur dioxide. The exceedances of sulphur dioxide will occur between the right-of-way boundaries. Exceedances of nitrogen dioxide can reach outside the road right-of-way. Due to the high uncertainty of the mathematical modelling, it will be necessary to measure concentrations of air pollutants (NO₂ and SO₂).

Potential threats can arise from disturbances to water regimes within the listed area. This threat is minimised by technical solutions: running the road grade line on a small embankment, which eliminates a need for road cuts that may require works related to a drainage system.

A parish cemetery of the Divine Motherhood of Virgin Mary in Pruszków - Żbików (listed as no 1472 on 20/02/1991) is another historic object located within the sphere of negative effects of the investment. The historic part of the cemetery is located in its centre approx 200m to the planned motorway. Therefore, it is predicated that the motorway will have no negative effect on this part of the cemetery.



Picture 4.2 Cemetery in Pruszków (the area allocated for the planned motorway is marked in red)

The motorway will run through the tree-covered area between the cemetery and the water treatment plant in Pruszków, along the contemporary wall, which fences the cemetery. The object will not be threatened directly – the area will not be allocated for the motorway. The roadway edge will run approx 10m from the cemetery fencing on project completion.

The construction and then operation of the road can cause damage or ruin the (contemporary) wall and gravestones nearby. In addition, noise produced by building machines, and later the traffic, will disturb the silence of the necropolis.

Additional negative effects are related to pollution emissions. The analyses conducted for this assessment indicate possible exceedances of limit values for nitrogen dioxide. This compound related to rainfalls can cause acid rains that could damage marble gravestones in the cemetery. The cemetery location within the region of the motorway and the existing road (Domaniewska Street) crossing, (the road grade line of the existing road will be raised, it will run on a viaduct over the motorway), can result in the object (i.e. the cemetery) being dominated by the road layout.

Part of the cultural goods, which is situated along the motorway, will be threatened with negative effects (noise, air pollution, vibrations) when the road will be operated. There are a few listed objects, mainly shrines and roadside crosses, within the road right-of-way (which includes the crossing roads that are to be reconstructed).

The table lists objects that can be threatened during the operation of the planned A2 motorway and proposes the protection measures that should be undertaken to reduce the irreparable damage and negative effects caused by the route operation.

Table 4.2 List of cultural objects threatened by the construction of the A2 motorway

Number conforms with Annex No 4	Motorway kilometre	Place	Object	Distance to motorway	Assessment of potential threats and damage to the object
5	415+500	Miedniewice	Roadside shrine	410	Potential damage threat during the road construction due to the construction of a local road in its vicinity

6	415+750	Hipolitów	Roadside cross	90m	Potential damage threat during the road construction due to the construction of a service road in its vicinity
8	420+230	Wiskitki	Roadside cross	within the road right-of-way	Located within the road right-of-way and threatened with pollution
11	420+400	Wiskitki	Parish Roman Catholic cemetery and Chapel – mausoleum	60m	Threatened during the construction; threatened during the operation with noise and vibrations
12	420+500	Wiskitki	Chapel	200m	Located next to an access road; possible damage during the construction (transport of materials to the construction site)
14	426+800	Holendry Baranowskie	Roadside shrine	within the road right-of-way	Threatened with complete damage
15	427+000	Holendry Baranowskie	Roadside shrine	within the road right-of-way	Threatened with complete damage
17	428+200	Baranów	Parish Roman Catholic cemetery	50m	Potential damage threat during the road construction; exposure to noise during the operation
22	436+900	Stare Kłudno	Roadside cross	within the road right-of-way	Requires changing the location
23	438+500	Tłuste	Roadside shrine	420	Potential damage threat during the road construction due to the construction of a local road in its vicinity
26	440+700	Żuków	Complex of a parish church: church, bell tower, fencing	80m	Can be threatened during the construction; exposed to noise during the operation
30	442+950	Kotowice	Roadside shrine, Statue of Mother of God	within the road right-of-way	Threatened by the construction of access roads; requires changing a location
31	450+100	Pruszków –Żbików	Parish cemetery	10m	Located in an immediate vicinity of the planned motorway; threatened during the construction and operation
34	452+750	Pruszków -Żbików (ul. Żbikowska 51 and 56)	Hoser horticultural complex		South-western part located within the road right-of-way – threatened with complete destruction; other areas of the
35	455+700	Jawczyce	Roadside shrine	within the road right-of-way	Located within the reach of motorway exits, threatened with complete damage
36	455+900	Jawczyce	Roadside cross	within the road right-of-way	Located within a group of horse-chestnuts; requires changing the location

Where historic objects (it applies to listed crosses and roadside shrines) are located within the right-of-way boundaries, they directly collide with the planned motorway and there is a threat of damaging them. For this reason, the objects will have to be moved into different locations.

4.9. Effects on human health

The main traffic flows between Łódź and Warsaw run through national roads No 2 and 8. Both roads run through the areas where land development is diversified. The dispersed development is often located in close proximity to these roads. In addition, the national road No 2 runs through the densely built-up areas in Błonie and Ożarów Mazowiecki. Both roads are fully accessible to all road users including pedestrians and cyclists. The national road No 2 in the majority of its length has one roadway; the national road No 8 has two dual-lane roadways. The majority of junctions the national roads cross other roads (various categories) are intersections at grade with traffic lights or the right of way. The central reservation of the national road No 8 is often broken to allow turning left.

A continuous increase in traffic flow, full accessibility, lack of non-collision junctions, and the presence of pedestrians contribute to a significant number of accidents that take place on both roads each year. According to the data collected by the Voivodeship Police Headquarters in Radom from January 2002 to the end of 2006, there were 97 accidents and 1,073 collisions, including 29 fatal accidents and 123 casualties on the national road No 2, section from Sochaczew to Warsaw. At the same time, there were 97 accidents and 80 collisions, including 21 fatal accidents and 79 casualties on the national road No 8, section from Mszczonów to Warsaw. Accidents were mainly caused by excessive speed, violating right of way, and car accidents involving pedestrians. Because both roads are transits, the significant number of drivers travel large distances, and ignore speed limits in the built-up areas, junctions and pedestrian crossings to save time. Driving at a considerable speed in places where other vehicles join traffic or pedestrians cross the roadway gives a driver little time to react if a new road user appears: it is not possible to break or escape.

If the motorway is not constructed, the trend will continue to increase: the road safety will continue to worsen and we can expect an increase in number of accidents. In addition, the predicted increase will have negative effects on human health because of the increase in noise levels and quantities of exhaust emissions, which has been shown in this impact assessment.

To recapitulate, it can be concluded that the accidents caused by reckless driving (drivers do not adjust speed to traffic conditions, violate right of way, and do not keep the safe distance between vehicles) are one of the key problems. It is often caused by road sections where overtaking is not possible. The fact that particular road user groups are not separated to ensure road safety along the analysed national roads also contributes. A limited number of pedestrian crossings causes accidents involving pedestrians: these road users can cross the roadway anywhere and they are not protected.

The A2 motorway is planned to improve the road safety because:

- the significant numbers of vehicles will be diverted to the motorway (transit traffic), which will reduce accident risk on the existing national and voivodeship roads; they will become an alternative to the A2,
- all unprotected road users will not be allowed on the motorway,
- the road accessibility will be limited (access only in interchanges),
- two dual- to four-lane roadways will ensure safe, cyclical overtaking,
- the technical parameters of the planned motorway will ensure the driving comfort, which will make road users feel safer,
- the appropriate road infrastructure will influence the road safety (road barriers, appropriate drainage system),
- appropriate traffic signs and road markings will be used,
- clear solutions within the regions of junctions and interchanges will be used;
- additional lanes to join and leave traffic will be provided in motorway approach and exit lanes,
- the motorway will be fully fenced, which will minimise the risk of collisions with animals.

These are the advantages of the proposed investment project. It must be remembered that it will not eliminate all traffic incidents. However, it will reduce the number and severity of accidents. Despite this, road incidents can still occur in the region of interchanges where vehicles join or leave traffic, or weave. Accidents will be mostly caused by end-on collisions involving a larger number of vehicles. Typical of this road category, these accidents are caused by not keeping the right distance between vehicles, preceding cars breaking unexpectedly, reckless driving and absent-minded drivers. Head-on collisions (driving in a wrong direction, e.g. on slip roads) and driving into fixed structures such as viaduct piers and barriers also happen. Therefore, to reduce the number of traffic incidents it is important to:

- reduce number of exits and approaches and ensure the appropriate distance between interchanges,
- ensure the interchange geometry (including traffic organisation) is understandable,
- ensure the appropriate visibility allowing to stop a vehicle,
- ensure the sections with a possibility of weaving are long enough,
- locate road closures/exclusions on the right side of the road,
- provide the appropriate road safety equipment,
- include elements of a typical cross-section that ensures the required road safety level,
- ensure the appropriate maintenance of both the road surface and road equipment.

To recapitulate, it must be concluded that the accident occurrence is influenced by many factors such as difficult to understand geometry, inappropriate visibility, or too short weaving sections. Interchanges, junctions with the lowest number of collision points, that is junctions with the traffic distribution such as roundabouts and three-way junctions, positively influence road safety. All interchanges on the motorway are two-level and have lanes to join traffic, which

considerably improves road safety. In addition, the application of the most advantageous geometrical parameters, which improve the road visibility and ability to decode a road (self-explaining road), ensures a high safety level. If structures such as bridge piers or deep ditches obstruct the shoulder, the road must be equipped with appropriate road safety equipment to protect against the effects of a possible collision. In terms of road safety, it is very important to maintain the motorway within the region of interchanges; both the road surface (slip roads with significant road gradient) and lighting.

The interchange concepts proposed in the projects are widely-used solutions. Two dual-to four-lane roadways ensure a high level of road safety.

5. DESCRIPTION OF MEASURES PROPOSED TO AVOID, REDUCE AND OFFSET ADVERSE EFFECTS ON THE ENVIRONMENT AND THEIR ASSESSMENT

5.1.1. Effects on the land surface and soil

- The soil (land) is threatened with contamination by substances transmitted from the road by air and water flowing down the road surface during the road operation.
- The planned road will impact soil insignificantly, which is confirmed by the studies of other already existing roads with similar or heavier traffic flow. It can be assumed that the planned motorway will not influence the concentration of contaminants in soil significantly.
- Minimising the negative road impact on the land surface and soil is mostly related to the reduction of contaminants spreading: mostly heavy metals and petroleum hydrocarbons. The appropriate rainwater water discharge and treatment systems, which will comprise sand interceptor/sand trap and retention-infiltration basin systems, will ensure that threats of contaminating soil with contaminated runoffs will be reduced.
- It is advised to observe regulations concerning winter road maintenance that limit the use of de-icing substances that contain chlorides to reduce the concentration of chlorides in road wastewater.
- The roadside planting proposed in this assessment will positively influence the soil protection. The vegetation reduces the road impact on soil, because it limits the secondary dusting from the surface, hampers the contamination spreading, and prevents erosion processes.

5.1.2. Effects on the surface water and groundwater

- Contamination from splashing, rainwater and melt water flows from the road surface and drops of substances dangerous to the environment in case of serious accidents are the source of direct adverse effects on surface water and indirect effects on groundwater during the road operation.
- The analyses show that a limit value of total suspended solids can be exceeded.
- The predicted concentration of petroleum hydrocarbons in rainwater flowing down the A2 motorway surface will not exceed the limit value.
- In practice, the planned route crosses various watercourse and drainage ditches along its whole length. These watercourses will act as receiving bodies catching rainwater and melt water flowing down the motorway.
- A few parts of the analysed A2 section run through the areas where a high or increased sensitivity to the groundwater contamination has been identified. In most cases, this sensitivity is caused by a poorly protected main useful aquifer:
 - o From kilometre 418+700 to kilometre 418+900: a part runs several dozen metres from a water intake structure,
 - o From kilometre 424+100 to kilometre 425+650: the region of intakes in Feliksów and Kozłowice Nowe,
 - o From kilometre 426+550 to kilometre 428+450: rich in water and a poorly protected part of the Kozłowska Gully,
 - o From kilometre 430+150 to kilometre 432+200: a poorly protected aquifer,
 - o From kilometre 440+100 to kilometre 442+000: a poorly protected Rokitnica Valley,
 - o From kilometre 443+050 to kilometre 449+100: an area with a variable protection related to the rich Brwinowska Gully,
 - o From kilometre 450+000 to kilometre 450+800: a poorly protected aquifer, from kilometre 452+700 to kilometre 456+239,67: an unprotected aquifer.
- It is advised to construct the sealed rainwater and melt water discharge system to minimise negative effects on waters present in the discussed sections.
- The sealed rainwater discharge system can comprise sealed drainage ditches (sides and the bottom sealed), grassy ditches secured with geomembranes, bentonite mats, or sealed wastewater systems.
- There is no need to introduce additional measures related to the rainwater discharge in other motorway sections. However, it is advised to discharge rainwater using grassy ditches if possible. This way the purifying properties of ditches will be used.
- Due to the possibility of exceedances of total suspended solids, it will be necessary to pre-treat wastewater before it is discharged to receiving bodies in sand interceptors; it is advised to use a shut-off valve at the outlet of each sand interceptor/sand trap to allow shutting the outlet in case of a spillage of environmentally dangerous substances.
- Water flowing down slopes will run into open grassy ditches, and as the so-called clean water, it will not require any treatment.
- A series of retention-infiltration basins has been proposed for the analysed motorway section. The basins aim to discharge the rainwater and melt water pre-treated in sand interceptors/sand traps to the soil and mitigate a runoff weave before it is directed to a receiving body.
- It is proposed not to compact the basin edges (or strengthen them in a natural way); they should have a moderate slope, which will enable the vegetation to grow around the basin.
- An exact location and parameters will be determined at a project designing stage. It is allowed to move the location of basins by +/- 150m.

- It is also allowed to resign from some basins if detailed hydrological calculations show that there is no need to use them, because the predicted quantities of discharged water will not disturb the water flow in a receiving body, to which it will be directed.

- If retention-infiltration basins are located next to the bridges, which will act as corridors for small and medium-size animals (at kilometres 414+590, 417+681, 421+982, 425+554, 430+473, 432+234, 437+606 and 444+793), it will be necessary to use one of the following solutions in order to maintain the widths and angles appropriate for approaching animals:

1) move a basin minimum 75m from the corridor (bridge) edge (in which case the basin can be fenced),
2) if it is not possible to follow recommendation 1 (e.g. because of a road right-of-way boundaries), the basin should not be located in this place (provided that the hydrological calculations allow to do this),

3) if it is not possible to resign from a basin's location for hydrological reasons, the basin must be left unfenced (but its edge cannot be located closer than 20m to the edge of the structure). In this case, it is necessary to construct a very moderate edge slope and densely plant the vegetation around its edges. The fencing needs to run between the basin and motorway edge, and be smoothly combined with anti-dazzle screens of the object.

- In the areas where the services, highway maintenance sections, toll plazas and toll points are located, it is proposed to handle wastewater in the following way:

o wastewater contaminated with hydrocarbons collected from the site around a petrol station and garage: pre-treated in separators,

o wastewater from bays for vehicles carrying dangerous goods must be discharged to a hermetic basin. If it is necessary, the wastewater can be neutralised in this basin,

o municipal wastewater to be discharged into the sanitary wastewater system and then to a biological water treatment plant,

o other wastewater with insignificant contamination: pre-treatment in sand interceptions/sand traps.

- The road operator will be obliged to obtain permits required by the Act on Water Law concerning the construction and reconstruction of water equipment and the wastewater discharge to water or soil.

- The effectiveness of these solutions will be subject to the audit of impacts.

5.1.3. Effects on the acoustic environment

- The motorway will take part of the present traffic from national roads No 2 and 8. The analyses show that the implementation of the investment project will have a positive effect on the acoustic environment in the developments located along these roads.

- The prognoses for the areas located along the planned motorway show that approx 230 residential buildings will be affected by negative effects of noise in 2025.

For this reason, it is necessary to use sound barriers, which will reduce the negative impact on residential buildings related to the motorway operation. To achieve that, it has been proposed to construct noise barriers that absorb sound and earth embankments. The parameters of the proposed barriers have been shown in a table below:

Table 5.1 Basic parameters and approximate location of the proposed sound barriers and earth embankments

No.	Barrier number	Barrier length* (m)	Barrier height (m)	Barrier type	Barrier begins at approx kilometre*	Barrier location pursuant to increasing kilometres
1	Noise barrier no 1a	175	4.5	Sound absorbing*	412+140	Left side
2	Noise barrier no 1	380	4.5	Sound absorbing*	412+330	Left side
3	Earth embankment no 2	1105	4.0	Earth embankment	413+170	Left side
4	Noise barrier no 3	440	6.0	Sound absorbing*	414+320	Left side
5	Noise barrier no 4	510	6.0	Sound absorbing*	415+060	Left side
6	Noise barrier no 5	700	6.0	Sound absorbing*	415+610	Left side
7	Noise barrier no 6a	300	6.0	Sound absorbing*	418+540	Left side

8	Noise barrier no 6	510	6.0	Sound absorbing*	418+885	Left side
9	Noise barrier no 7	320	4.0	Sound absorbing*	420+035	Left side, on a road above the A2
10	Noise barrier no 8	615	4.5	Sound absorbing*	421+960	Left side
11	Noise barrier no 9	710	6.0	Sound absorbing*	422+635	Left side
12	Noise barrier no 9a	250	6.0	Sound absorbing*	424+370	Left side
13	Noise barrier no 10	320	4.5	Sound absorbing*	424+640	Left side
14	Noise barrier no 11	950	4.5	Sound absorbing*	425+700	Left side
15	Noise barrier no 12	275	4.5	Sound absorbing*	426+670	Left side
16	Noise barrier no 13	1205	6	Sound absorbing*	427+590	Left side
17	Noise barrier no 13a	30	6	Sound absorbing*	428+800	Left side
18	Noise barrier no 14	1920	6	Sound absorbing*	428+850	Left side
19	Earth embankment no 15	325	4	Earth embankment	432+455	Left side
20	Earth embankment no 16	1025	4	Earth embankment	432+800	Left side
21	Earth embankment no 17	860	4	Earth embankment	434+355	Left side
22	Noise barrier no 18	575	6	Sound absorbing*	436+150	Left side
23	Noise barrier no 19	375	4.5	Sound absorbing*	436+725	Left side
24	Noise barrier no 20	120	4.5	Sound absorbing*	437+120	Left side
25	Noise barrier no 21	413	4	Sound absorbing*	438+335	Left side, slip road
26	Noise barrier no 22	170	4	Sound absorbing*	438+100	Left side, slip road

27	Noise barrier no 23**	370	4.5	Sound absorbing*	438+150	Left side, slip road
28	Noise barrier no 24**	280	4.5	Sound absorbing*	438+300	Left side, slip road
29	Noise barrier no 25**	60	4	Sound absorbing*	438+500	Left side, slip road
30	Noise barrier no 26	1275	4.5	Sound absorbing*	438+350	Left side
31	Noise barrier no 27	730	4.5	Sound absorbing*	442+005	Left side
32	Noise barrier no 28	340	6	Sound absorbing*	442+700	Left side
33	Noise barrier no 29	435	4.5	Sound absorbing*	443+105	Left side
34	Noise barrier no 29a	215	4.5	Sound absorbing*	443+495	Left side
35	Noise barrier no 30	930	4.5	Sound absorbing*	447+305	Left side
36	Earth embankment no 31	805	4	Earth embankment	448+600	Left side
37	Noise barrier no 33	235	4.5	Sound absorbing*	450+480	Left side
38	Noise barrier no 34	315	4.5	Sound absorbing*	450+900	Left side, on a road above the A2
39	Noise barrier no 35	45	4.5	Sound absorbing*	450+900	Left side, in a road above the A2
40	Noise barrier no 36	50	4.5	Sound absorbing*	450+900	Left side, on a road above the A2
41	Noise barrier no 37	176	4.5	Sound absorbing*	450+900	Left side, on a road above the A2
42	Noise barrier no 38	790	4.5	Sound absorbing*	451+485	Left side
43	Noise barrier no 39	1230	4.5	Sound absorbing*	452+300	Left side
44	Noise barrier no 40	1130	4.5	Sound absorbing*	455+600	Left side, S-8
45	Noise barrier no 41	530	4.5	Sound absorbing*	411+450	Right side

46	Earth embankment no 42	520	4.0	Earth embankment	412+320	Right side
47	Earth embankment no 43	660	4.0	Earth embankment	413+600	Right side
48	Noise barrier no 44	830	4.5	Sound absorbing*	414+760	Right side
49	Noise barrier no 45	550	4.5	Sound absorbing*	414+625	Right side
50	Noise barrier no 46	375	4.5	Sound absorbing*	416+590	Right side
51	Noise barrier no 47	195	4.5	Sound absorbing*	417+000	Right side
52	Noise barrier no 48	225	4.5	Sound absorbing*	420+045	Right side
53	Earth embankment no 49	375	4.0	Earth embankment	420+320	Right side
54	Noise barrier no 50	430	4.5	Sound absorbing*	422+120	Right side
55	Noise barrier no 51	570	6.0	Sound absorbing*	422+590	Right side
56	Noise barrier no 52	735	4.5	Sound absorbing*	423+900	Right side
57	Noise barrier no 53	625	4.5	Sound absorbing*	424+645	Right side
58	Noise barrier no 54	380	4.5	Sound absorbing*	425+570	Right side
59	Noise barrier no 55	445	6.0	Sound absorbing*	425+950	Right side
60	Noise barrier no 56	230	4.5	Sound absorbing*	426+395	Right side
61	Noise barrier no 56a	40	4.5	Sound absorbing*	426+655	Right side
62	Noise barrier no 57	257	4.5	Sound absorbing*	426+695	Right side
63	Noise barrier no 57a	220	4.5	Sound absorbing*	426+905	Right side
64	Noise barrier no 57b	400	4.5	Sound absorbing*	428+000	Right side

65	Noise barrier no 58	435	4.5	Sound absorbing*	428+405	Right side
66	Noise barrier no 59	1770	4.5	Sound absorbing*	428+855	Right side
67	Noise barrier no 60	265	4.5	Sound absorbing*	432+500	Right side
68	Noise barrier no 61	425	4.5	Sound absorbing*	432+795	Right side
69	Earth embankment no 62	195	4.0	Earth embankment	433+645	Right side
71	Noise barrier no 64	475	6.0	Sound absorbing*	434+750	Right side
72	Noise barrier no 65	940	6.0	Sound absorbing*	435+255	Right side
73	Earth embankment no 66	900	4.0	Earth embankment	436+190	Right side
74	Noise barrier no 67	495	6.0	Sound absorbing*	438+040	Right side
75	Noise barrier no 68**	270	4.5	Sound absorbing*	438+000	Right side, slip road
76	Noise barrier no 69**	85	4.5	Sound absorbing*	438+300	Right side, slip road
77	Noise barrier no 70	385	4.5	Sound absorbing*	438+540	Right side, slip road
78	Noise barrier no 71	1485	6.0	Sound absorbing*	438+830	Right side
79	Noise barrier no 72	1000	4.5	Sound absorbing*	441+180	Right side
80	Noise barrier no 73	375	6.0	Sound absorbing*	442+180	Right side
81	Noise barrier no 74	530	4.5	Sound absorbing*	442+555	Right side
82	Noise barrier no 75	400	4.5	Sound absorbing*	443+135	Right side
83	Noise barrier no 76	225	4.5	Sound absorbing*	444+355	Right side
84	Noise barrier no 77	85	6.0	Sound absorbing*	444+580	Right side

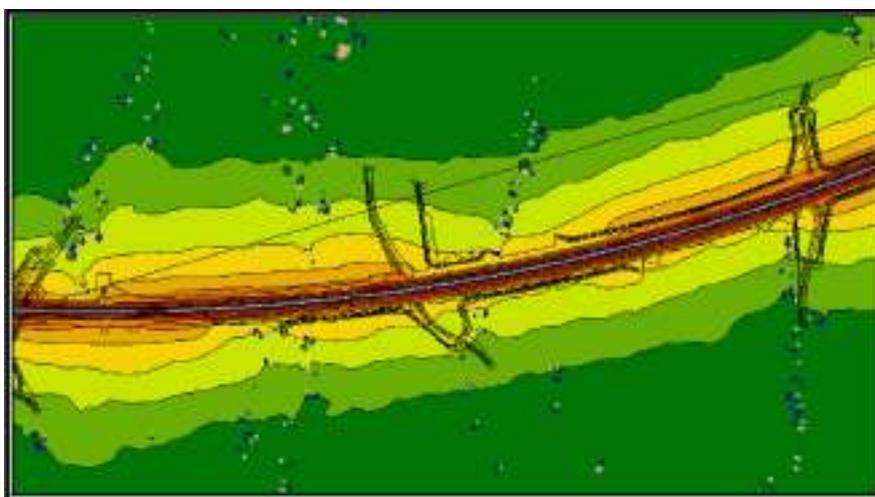
85	Noise barrier no 78	310	6.0	Sound absorbing*	444+695	Right side
86	Noise barrier no 79	220	4.5	Sound absorbing*	445+000	Right side
87	Noise barrier no 80	970	4.5	Sound absorbing*	447+305	Right side
88	Noise barrier no 81	190	6.0	Sound absorbing*	449+220	Right side
71	Noise barrier no 64	475	6.0	Sound absorbing*	434+750	Right side
89	Noise barrier no 82	380	6.0	Sound absorbing*	449+440	Right side
90	Noise barrier no 83	505	4.0	Sound absorbing*	449+950	Right side
91	Noise barrier no 84	57	4.0	Sound absorbing*	450+480	Right side
92	Noise barrier no 85	740	4.5	Sound absorbing*	450+540	Right side, slip road
93	Noise barrier no 86	105	4.5	Sound absorbing*	450+860	Right side, slip road
94	Noise barrier no 87	80	4.5	Sound absorbing*	450+900	Right side, slip road
95	Noise barrier no 88	1045	4.5	Sound absorbing*	450+900	Right side, slip road
96	Noise barrier no 89	775	4.5	Sound absorbing*	451+485	Right side
97	Noise barrier no 90	1250	4.5	Sound absorbing*	452+285	Right side
98	Noise barrier no 90a	1380	5.0	Sound absorbing*	453+535	Right side
99	Noise barrier no 90b	578	4.5	Sound absorbing*	454+960	Right side, slip road to S-8
100	Noise barrier no 90c	360	4.5	Sound absorbing*	455+370	Right side
101	Noise barrier no 90d	425	6.0	Sound absorbing*	455+800	Left side, slip road to s-8
102	Noise barrier no 90e	40	5.0	Sound absorbing*	454+905	Right side

103	Noise barrier no 91	470	4.5	Sound absorbing*	455+685	Left side, S-8
104	Noise barrier no 39a	1415	4.5	Sound absorbing*	453+520	Left side
105	Noise barrier no 39b	720	4.5	Sound absorbing*	454+985	Left side, slip road to S-8

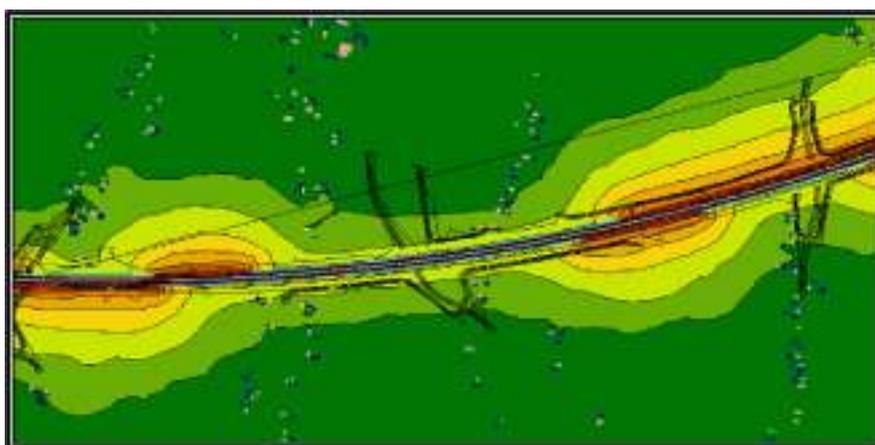
*) It is advised the sound barriers located on viaducts are transparent. It is also allowed to change panels (into transparent ones) on consultation with owners of properties they will protect. It is proposed to construct acoustic gates next to the places allocated for company vehicles.

**) If a voivodeship road No 597 is reconstructed, it is not advisable to erect these barriers. However, the present situation requires these barriers are equipped with gates allowing access to properties.

The pictures show examples of effectiveness of the proposed sound barriers

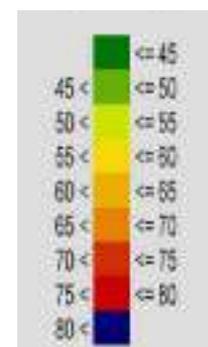


Before protection

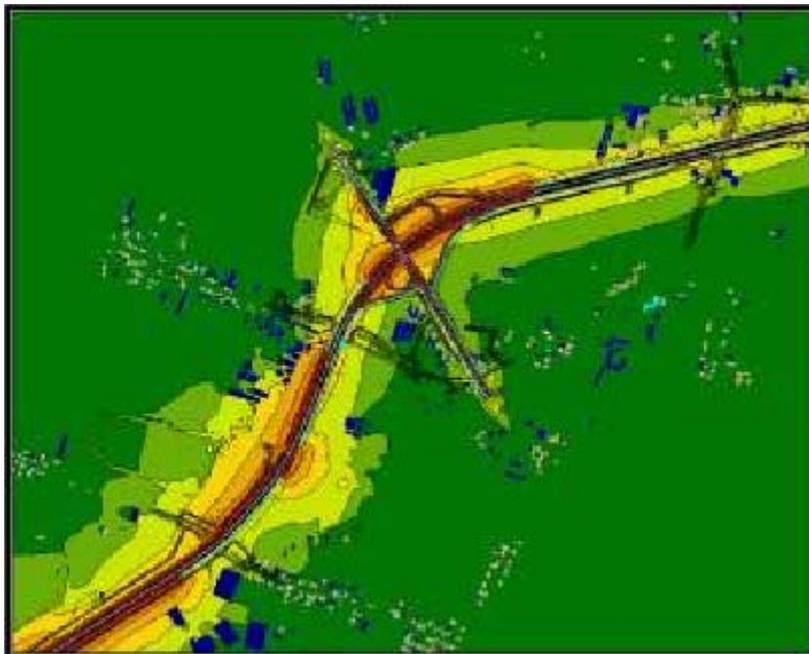


After protection

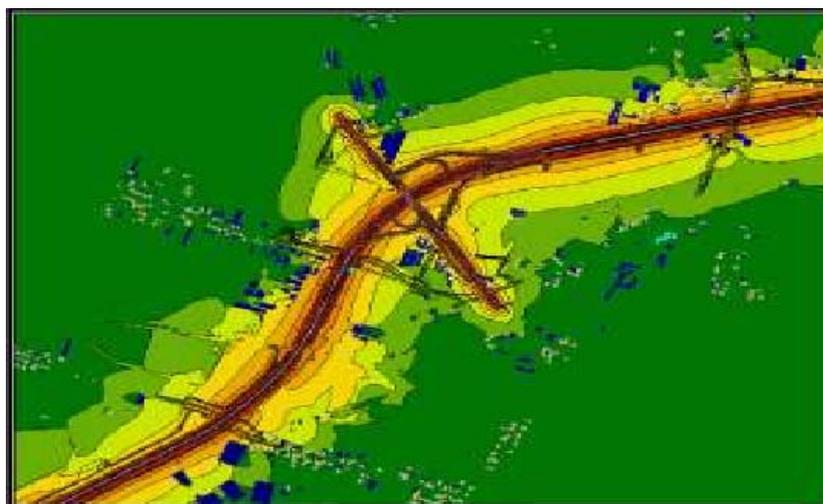
Equivalent sound level in dB (A)



Picture 5.1 Acoustic environment around the planned A2 motorway at kilometre 416, night-time, 2025

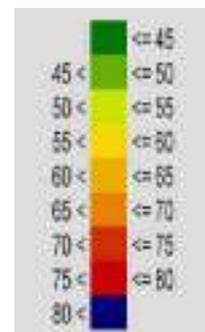


Before protection



After protection

Equivalent sound level in dB (A)



Picture 5.2 Acoustic environment around the planned A2 motorway at kilometre 454 (interchange Pruszków is visible), night-time, 2025

- The analysis shows that there are a few dispersed farmsteads located in a close proximity to the investment project that are subject to protection. Their close proximity to the source of noise (motorway) necessitates providing the effective protection (barriers) on a quite long section. It is advised to consider purchasing these buildings instead of constructing barriers. This type of action requires the property owners consent to sell.
- There are a few objects located in the most affected section (Pruszków - Konotopa) where, because of their close proximity to the roadway, it will be impossible to maintain the noise limit value after the protection is constructed. It is proposed to purchase these buildings before the investment project commences.
- The table below lists the buildings that are proposed to be purchased:

Table 5.2 List of residential buildings for which the construction of noise barriers may not be cost-effective and buildings that cannot be protected against excessive noise for technical reasons

No.	Number conforms with Annex No 6	Location of residential buildings in relation to the motorway (at A2 kilometre) and their proximity to the roadway edge	Noise barrier length (m)	Noise barrier height (m)	Proposed solution
1	Barrier no 41 (Right side)	411+675 (100m)	530	4.5	A proposed noise barrier will protect only one residential building. It is advisable to consider whether purchasing the property would not be more economic. The earth embankment (at kilometre 411+540, 425m long and 4.0m high) proposed at the project stage will protect buildings located in a larger distance to the motorway.
2	Barrier no 1a, 1 (Left side)	412+375 (130m)	175, 575	4.5, 4.5	Proposed noise barriers will protect only one residential building. It is advisable to consider whether purchasing this property would not be more economic.
3	Embankment no 2	413+640 (110m) (Left side)	1105	4.0	It will have to be determined at the stage of the audit of impacts whether the residential building (which at the stage of the impact assessment is almost at the night-time noise limit value) will be affected by noise limit exceedances, and decide which will be more economic to purchase or protect this property.
4	Barrier no 44 (Right side)	415+110 (70m)	830	4.5	It will have to be determined at the stage of the audit of impacts whether the residential building (which at the stage of the impact assessment is almost at the night-time noise limit value) will be affected by noise limit exceedances, and possibly decide to purchase this property.
5	Barrier no 50, 51 (Right side)	422+600 (110m) 422+640 (55m)	430, 585	4.5, 6.0	A proposed noise barrier will protect two residential buildings. It is advisable to consider whether purchasing the property would not be more economic. Proposed at the project stage earth embankments (at kilometre 422+100, kilometre 422+600, 425, 535m long / 4.0m high each) will protect buildings located in a distance to the motorway.
6	Barrier no 8, 9 (Left side)	422+840 (60m) (purchase) 422+140 (200m) 422+910 (105m) 422+950 (130m) (possibly to check what if earth embankments were used)	670, 710	4.5, 6.0	Proposed noise barriers will protect four residential buildings. It is advisable to consider whether purchasing the one in the closet proximity to A2 would not be more economic. Earth embankments (at kilometre 422+000, at kilometre 422+650, 600, 880m long/ 4.0m high each) will effectively protect three other residential buildings located slightly farther to the motorway (according to the prognoses at the stage of the impact assessment, they will almost be at the night-time noise limit values) and a few located much farther. However, it is advised to check at the stage of the audit of impacts whether these buildings are not affected by noise limit exceedances, and then decide about their possible purchase.

7	Barrier no 52, 53 (Right side)	424+320 (75m) 424+750 (50m)	735, 625	4.5, 4.5	It will have to be determined at the stage of the audit of impacts whether the residential buildings (which at the stage of the impact assessment are almost at the night-time noise limit values) will be affected by noise limit exceedances, and decide about their possible purchase.
8	Barrier no 9a, 10 (Left side)	424+725 (75m) 424+730 (95m)	250, 320	6.0, 4.5	Proposed noise barriers will protect two residential buildings. It is advisable to consider whether purchasing these properties would not be more economic.
9	Barrier no 54, 55, 56, 56a, 57, 57a (Right side)	426+180 (40m)	380, 445, 231, 40, 257, 220	4.5, 6.0, 4.5, 4.5, 4.5, 4.5	Proposed noise barriers will protect one residential building. It is advisable to consider whether purchasing this property would not be more economic. The earth embankment (at kilometre 425+950, at kilometre 426+700, at kilometre 426+950, 650, 190, 315m long / 4.0m high each) proposed at the project stage will protect buildings located in a larger distance to the motorway.
10	Barrier no 11, 12 (Left side)	426+660 (120m) (purchase) 425+750 (300m) 426+575 (160m) (to check what if earth embankments were used)	950, 275	4.5, 4.5	A proposed noise barrier will protect three residential buildings. It is advisable to consider whether purchasing the one in the closet proximity to A2 would not be more economic. Earth embankments proposed at the project stage (at kilometre 426+000, at kilometre 427+150, 550, 360m long / 4.0m high each) will protect buildings located in a larger distance to the motorway. At the stage of the impact assessment, it seems that they will be almost at the night-time noise limit values. For this reason, it is suggested to check at the stage of the audit of impacts whether these two buildings will not be affected by noise limit exceedances, and decide about their possible additional protection.
11	Barrier no 13, 13a, 14 (Left side)	427+960 (175m) 428+010 (50m)* 428+575 (50m)* 429+280 (60m)* 429+325 (160m) 430+070 (255m) 430+080 (85m) 430+220 (215m) 430+530 (165m) 430+530 (200m)	1230, 1920	6.0	A proposed noise barrier will protect thirteen residential buildings. It is advisable to consider whether purchasing ten properties would not be more economic. Proposed at the project stage earth embankments (at kilometre 427+500, at kilometre 427+700, at kilometre 428+750, at kilometre 428+850, 135, 1030, 65, 280m long / 4.0m high each) will protect buildings located in a larger distance to the motorway. If the barrier is built (no purchases), three residential buildings (*) will be covered by the zone where noise is almost at the night-time limit values (at the stage of the impact assessment). It will be necessary to check at the stage of the audit of impacts whether these buildings are not affected by noise limit exceedances, and then decide about their possible additional protection.
12	Barrier 59 (Right side)	430+000 (50m)	1770	4.5	It will have to be determined at the stage of the audit of impacts whether the residential building (which at the stage of the impact assessment is almost at the night-time noise limit value) will be affected by exceedances of noise limits, and decide about its possible additional protection.

13	Barrier 60, 61 (Right side)	432+850 (135m)	275, 430	4.5, 4.5	Proposed noise barriers will protect one residential building. It is advisable to consider whether purchasing the property would not be more economic. If the property is purchased, there will be no need to construct an earth embankment.
14	Earth embankment 15, 16	433+300 (135m) (Left side)	325, 1025	4.0	It will have to be determined at the stage of the audit of impacts whether the residential building (which at the stage of the impact assessment is almost at the night-time noise limit value) will be affected by exceedances of noise limits, and then decide about its possible purchase of another protection type.
15	Barrier 64, 65 (Right side)	435+100 (65m)* 435+300 (185m) 435+410 (200m) 435+750 (60m)* 435+800 (130m)	485, 950	6.0, 6.0	A proposed noise barrier will protect five residential buildings. It is advisable to consider whether purchasing these properties would not be more economic. If the barrier is built (no purchases), two residential buildings (*) will be covered by the zone where noise is almost at the night-time limit values (at the stage of the impact assessment). It will be necessary to check at the stage of the audit of impacts whether these buildings are not affected noise limit exceedances, and then decide about their possible purchase. If the noise barrier is not constructed, the earth embankment proposed at the project stage should be constructed (at kilometre 434+800, at kilometre 435+250 460, 1825m long/ 4.0m high each).
16	Barrier no 18, 19, 20 (Left side)	436+400 (85m) 437+000 (135m)	575, 375, 120	6.0, 4.5, 4.5	Proposed noise barriers will protect three residential buildings. It is advisable to consider whether purchasing the two in the closet proximity to A2 would not be more economic. Earth embankments proposed at the project stage (at kilometre 436+150, 940 m long / 4.0m high each) will protect the remaining building located in a larger distance to the motorway.
17	Barrier no 68 (A2 right side, left of the slip road)	438+300 (10m from a slip road)	270	4.5	It will have to be determined at the stage of the audit of impacts whether the residential building (which at the stage of the impact assessment is almost at the night-time noise limit value) will be affected by exceedances of noise limits, and decide about its possible additional protection or purchase.
18	Barrier 71 (Right side)	439+240 (50m) 439+260 (50m) 439+345 (50m)	1500	6.0	It will have to be determined at the stage of the audit of impacts whether the three residential buildings (which at the stage of the impact assessment are almost at the night-time noise limit value) will be affected by exceedances of noise limits, and decide about their possible additional protection.
19	Barrier 72, 73, 74 (Right side)	442+300 (70m) 442+370 (105m) 442+370 (85m)	1000, 375, 550	4.5, 6.0, 4.5	It will have to be determined at the stage of the audit of impacts whether the three residential buildings (which at the stage of the impact assessment are almost at the night-time noise limit value) will be affected by exceedances of noise limits, and decide about their possible additional protection.

20	Barrier 27, 28, 29 (Left side)	442+900 (80m) 442+910 (60m)	730, 360, 600	4.5, 6.0, 4.5	It will have to be determined at the stage of the audit of impacts whether the two residential buildings (which at the stage of the impact assessment are almost at the night-time noise limit value) will be affected by exceedances of noise limits, and decide about their possible additional protection.
21	-	447+050 (355m) 447+120 (315m) (Left side)	-	-	It will have to be determined at the stage of the audit of impacts whether the residential buildings (which at the stage of the impact assessment are almost at the night-time noise limit values) will be affected by exceedances of noise limits, and decide about their possible additional protection.
22	Barrier 80 (Right side)	447+650 (70m) 447+650 (85m) 447+670 (85m) 447+750 (100m)	970	4.5	It will have to be determined at the stage of the audit of impacts whether the four residential buildings (which at the stage of the impact assessment are almost at the night-time noise limit values) will be affected by exceedances of noise limits, and decide about their possible additional protection.
23	Barrier no 30 (Left side)	447+800 (100m)	930	4.5	A proposed noise barrier will protect one building. It is advisable to consider whether purchasing this property would not be more economic. The earth embankment proposed at the project stage (at kilometer 447+300, 305m long / 4.0m high) will protect buildings located in a larger distance to the motorway.
24	Barrier no 38, 39 (Left side)	451+880 (35m) 451+910 (50m) 451+970 (80m) 452+150 (110m) 452+190 (110m) 452+200 (95m) 452+240 (85m) 452+250 (30m) 452+270 (50m) 452+275 (80m) 452+290 (90m) 452+300 (105m) 452+455 (100m) 452+470 (85m) 452+500 (100m) 452+600 (55m) 452+640 (65m) 452+690 (90m) 453+030 (75m) 453+110 (45m) 452+440 (50m)	780, 1235	4.5, 4.5	A proposed noise barrier will protect many residential buildings, but it will not possible to maintain noise below its limit values for fourteen buildings. For this reason, it will necessary to purchase these properties. In the case of seven residential buildings it will necessary to check at the stage of the audit of impacts whether they will not be affected by noise limit exceedances, and if necessary, take appropriate measures.
25	Barrier no 89, 90 (Right side)	452+150 (55m) 452+155 (60m) 453+010 (125m) 453+150 (85m)	775, 1250	4.5, 4.5	A proposed noise barrier will protect many residential buildings, but it will not be possible to maintain noise below limit values for two buildings. For this reason, it will be necessary to purchase these properties. In the case of two other building, it will be necessary to check at the stage of the audit of impacts whether they will not be affected by noise limit exceedances.

26	Barrier no 39a (Left side)	453+600 (80m) 453+610 (65m)	1435	4.5	A proposed noise barrier will protect many residential buildings, but it will not be possible to maintain noise below limit values for two buildings. For this reason, it will be necessary to purchase these properties.
27	Barrier no 90a, 90e, 90b (Left side)	454+550 (110m) 454+750 (100m) 454+850 (105m)	1380, 40, 555	5.0, 5.0, 4.5	A proposed noise barrier will protect many residential buildings, but it will not be possible to maintain noise below limit values for three buildings. For this reason, it will be necessary to purchase these properties. In the case of buildings located in a larger distance to the motorway, it will have to be checked at the stage of the audit of impacts whether these buildings will not be affected by exceedances of noise limits, and decide about their possible purchase.
28	Barrier no 39b (Left side)	455+300 (65m) 455+350 (55m)	710	4.5	A proposed noise barrier will protect many residential buildings, but it will not be possible to maintain noise below limit values for two buildings. For this reason, it will be necessary to purchase these properties.
29	Barrier no 90d, 91 (Left side)	455+900 (22 m) 455+900 (35 m) 455+900 (23 m) 455+950 (35 m) 456+110 (50 m) 456+110 (110 m)	425, 495	6.0, 4.5	A proposed noise barrier will protect many residential buildings, but it will not be possible to maintain noise below limit values for six buildings. For this reason, it will be necessary to purchase these properties.
Legend					
Buildings, which should be purchased due to the inability to maintain the noise limit values after the protection have been used, have been marked in red.					
Buildings, the purchase of which should be considered for economic reasons (these solutions will be cheaper than the construction and operation of the barriers/embankments for proposed buildings), have been marked in yellow.					

- The prognoses show that the proposed solutions (barriers, purchases) will protect residential housing against the excessive noise levels.
- The effectiveness of the proposed protection against noise will be subject to the audit of impacts.

5.1.4. Effects of vibrations

- In order to avoid damaging buildings during the implementation of the investment project, the following should be done:
 - o Draw up an inventory of the technical condition of all buildings situated within an area of a predicted dynamic impact before the construction works commence. The inventory should contain the description and photographic documentation of all damages to the buildings existing before the works commence.
 - o Determine which vibrating rollers will be used before the works commence, and based on that, assess which areas will be affected by the dynamic impact. Some machines of this type have a smaller impact. It is advisable to use the machines with the smallest negative effects possible in the vicinity of the buildings.
 - o If the predicted dynamic impact zone covers buildings outside the road right-of-way, the measures to protect these buildings must be planned, if the construction project does not envisage any protection for these buildings.
- The complex studies and diagnostic analyses covering the detail assessment of the technical condition of buildings in the immediate proximity to the motorway and adjoining structures are required at the stage of drawing up the investment project.

The assessment of the buildings' technical condition will allow evaluating their condition during and after the motorway construction. This will allow determining the real impact. It may be necessary to provide the buildings with protection in justified cases.

- It is advised to monitor the impact through measuring the vibrations at the construction stage. This will be particularly important during the stage at which vibrating rollers are used.
- Vibrations can occur at the construction stage during the construction of piles for the planned flyovers and viaducts. To eliminate the impact of vibrations, it is advised to construct the piles around the buildings employing the technology, which does not cause vibrations.

5.1.5. Effects on the free air

- Based on the conducted analyses and prognoses, it has been concluded that there is a possibility of occurrences of exceedances of limit values for the analysed substances: benzene, sulphur dioxide, and nitrogen dioxide. However, only the exceedances of nitrogen dioxide can spread outside the road right-of-way.
- Due to a significant uncertainty of the analyses performed, it will be necessary to measure the concentrations of NO₂, SO₂ and benzene along the analysed motorway section during the audit of impacts.
- It has been proposed to introduce the green belts along the whole analysed motorway section, which will limit spreading of the contaminants onto the areas surrounding the investment project.
- The constructed motorway will take part of traffic from the existing parallel sections of national roads No 2 and 8, which will reduce the emissions and improve the free air quality along these roads.

5.1.6. Effects on the living nature

- The analysed investment project runs through four local animal migration routes and one regional migration route.
- To minimise the adverse barrier effect the motorway will create, the project must provide the animal corridors. The measures proposed to minimise the impact of the planned A2 motorway section onto the wild fauna have been designed to effectively reduce effects of the created ecological barrier.
- The construction of two migration corridors for large animals has been designed underneath the widened bridges in the motorway route.
- Seven animal corridors have been designed to minimise the motorway impact on the populations of medium-size ungulates (including small mammals and amphibians). All corridors are integrated with the bridges over rivers or streams.
- 37 corridors for small animals have been designed; 27 are the integrated structures that combine the function of an animal corridor and a culvert for small watercourses.
- 15 corridors for amphibians have been designed in total; this includes seven structures that comprise four culverts, seven that comprise two culverts and one structure that acts as a single culvert.

5.1.7. Effects on the landscape

- The planned investment project runs through the area, which is characterized by small height differences. The larger part of the investment project will run either at grade or on small embankments. The surrounding areas are open with sporadic groups of trees or remnants of former forest complexes. In these areas, the motorway will be visible from a large distance. Therefore, it is advised to plant vegetation to minimise the negative effect on the landscape. The planting should be designed this way that it smoothly blends with the planting proposed for the animal corridors.
- It is proposed that the planting is high (trees) and mid-size (bushes) in locations shown in the Annex.
- Native species can be used for planting.
- Noise barriers should be made in natural colours.
- It is advised to plant climbers around noise barriers in order to blend them into the landscape.

5.1.8. Effects on monuments and archaeological sites

- Two listed objects that will be covered by the immediate vicinity of the motorway can be threatened with the motorway impact during the construction and operation: the Hoser horticultural complex in Pruszków valued for its architectural-production character (in Żbikowska Street), and the parish cemetery in Pruszków Żbików.
- The planned motorway collides with the area covered by the Hoser horticultural complex. At present, (January 2008), an administration procedure continues, which aims to remove the area allocated for the planned road from the list of conservation areas. The implementation of the investment project will be possible only when this decision is obtained.
- The roadway edge will be located approx 10 metres from the fence separating the Hoser gardens. If no appropriate protection is in place, it is highly probable the fence will be damaged at the stage of the motorway construction or operation.
- To minimise the impact, it is necessary to:
 - o Prepare the appropriate technical report on the fence condition. Documentation to be prepared by the authorised persons (appointed by the Voivodeship Conservation Officer) before the construction works commence. Similar examination should be conducted on completion, and if necessary, during the construction works.

- o Minimise the impact of vibrations onto the historic object. To achieve this, it is suggested to construct a vibration suppression screen in the land along the wall before construction works commence in this section.
- o The aforementioned diagnostic examinations will allow to determine other (apart from the vibration suppression screen) requirements related to the necessity to protect the wall.
- o Construct a minimum 3m high temporary protection barrier for the time of the investment project implementation to prevent the contaminants (dusting) transfers into the garden complex and minimise the risk of damaging the historic wall.
- o It has been proposed to construct an absorbing noise barrier by the roadway in this motorway section in order to protect the residents in the areas neighbouring the motorway against noise and limit the contaminants (exhaust emissions) spreading onto the surroundings. In addition, creepers will be planted around the screen; they will also absorb part of pollution and let the barrier better blend into the landscape.
- o It is proposed to plant high and mid-size vegetation alongside the barrier.
- The motorway will run 10 metres from the fence of a historic cemetery in Pruszków-Żbików (at kilometre 513+000). A possibility of a negative impact onto the most valuable part of the cemetery, which is located in its centre, 200m from the motorway, is not predicted to occur.
- The construction and operation of the motorway can only affect the gravestones in the closest proximity to the motorway.
- To minimise the negative effects related to the motorway construction and caused by dusting within the cemetery region, it is advised to construct a temporary protection barrier to minimise quantities of dust transferred onto the cemetery area and isolate visitors from the motorway construction site. The barrier should be dismantled when the motorway construction is completed.
- It has been proposed to construct a 4-metre noise barrier along the cemetery to protect the silence of the necropolis.
- Prognoses of the air pollution show that the area in the immediate vicinity of the motorway, where part of the historic wall and the land of the horticultural complex and the cemetery are situated, can be affected by exceedances of limit values for nitrogen dioxide. It will be necessary to measure the air pollution within the framework of auditing the impacts in order to assess the real motorway impact on this area. Any further requirements for additional measures and a monitoring programme (if required) will be determined in relation to these studies.
- The listed roadside crosses and shrines are situated within the road right-of-way. Because of that, the liquidation of these objects that assumes moving them into different locations requires these objects be reported (as objects of small architecture) to the body responsible for issuing building permissions on obtaining the opinion of the Voivodeship Conservation Officer. The objects must be documented architecturally and photographically before their liquidation. It is advised to conduct the inventorying within the framework of works related to the construction project.
- The archaeological excavation works have been completed or are in progress (as of the 2007/2008 breakthrough) in the areas, which have been identified as archaeological sites that qualify for rescue research.
- It cannot be predicted whether all traces from the past have been examined within the framework of these works. It is possible that new sites will be discovered during the construction works. For this reason, a constant archaeological supervision of the construction site is necessary. If any new archaeological findings are discovered during the supervision, the supervision will become the archaeological research, which will precede the construction.

5.2. Recommendations for the EIA audit and monitoring

The audit of impacts when the investment project is in its operational phase aims to verify the correctness of the assumptions regarding the impact and determine the effectiveness of the proposed protection equipment.

For the analysed A2 motorway section, it has been suggested to audit the noise impact, the impact of pre-treated rainwater and melt water discharged to receiving bodies, and assess the air pollution at the boundary of the road right-of-way.

In addition, the use of animal corridors constructed within the Bolimów Landscape Park should be monitored pursuant to the provisions of the park protection plan.

6. CONCLUSION

Based on the analyses performed for the purposes of this environmental impact assessment, it can be concluded that the A2 motorway is a necessary investment. The traffic prognoses show that it will take a significant part of traffic, which at the moment flow the national roads No 2 and 8. The decrease in traffic will result in the improvement of the acoustic environment, road safety, and drop in the air pollution and the risk of occurrences of serious accidents in the areas surrounding these roads.

The implementation of the investment project will require the permanent use of 690ha of land, mostly agricultural and undeveloped land. The investment will not have any significant impact onto the areas, species and habitats of the Natura 2000 network. The analyses show that the deterioration of the acoustic environment, air pollution in surrounding areas, and running through the animal migration routes will be the biggest impact.

Taking into account the protection proposed in this assessment, i.e.:

- protection against sound (barriers, embankments, purchases),
- animal corridors,
- rainwater discharge and pre-treatment systems,

- vegetation planting,

it is concluded that the planned A2 motorway, section from Łódź / Mazovia Voivodeship at kilometre 411+465.80 to Konotopa Junction (including the junction) at kilometre 456+239.67 will not have a significant impact on the environment.

The investment project will not significantly impact the priority species and habitats; it will also have no impact onto the Natura 2000 area