

NON-SPECIALIST SUMMARY

OF THE ENVIRONMENTAL IMPACT REPORT

Construction of the Puławy Ring Road (Stage II)
in the line of the S12 Expressway: A1 (Piotrków
Trybunalski) – Sulejów – Radom – Puławy –
Kurów – Lublin – Piaski – Chełm – Dorohusk –
national border (Kiev).

Team of Authors:

dr Ryszard Gierżatowicz
mgr inż. Andrzej Karaś
dr hab. Marek Kucharczyk

Lublin, 2008

**TABLE OF
CONTENTS**

| | |
|---|-----------|
| 1. GENERAL INFORMATION | 3 |
| 2. LOCATION AND PARAMETERS OF THE UNDERTAKING | 7 |
| 3. ENVIRONMENTAL ELEMENTS WITHIN THE UNDERTAKING | 8 |
| 3.1. GEOLOGICAL STRUCTURE..... | 8 |
| 3.2. SURFACE WATER | 9 |
| 3.3. GROUNDWATER | 9 |
| 3.4. MINERAL DEPOSITS | 9 |
| 3.5. AIR | 9 |
| 3.6. ACOUSTIC CLIMATE | 10 |
| 3.7. ANIMATED NATURE | 10 |
| 3.8. PROTECTED AREAS | 11 |
| 4. TYPES AND DEGREE OF ENVIRONMENTAL IMPACT OF THE PLANNED UNDERTAKING | 12 |
| 5. IMPACT ON FLORA AND FAUNA | 13 |
| 6. IMPACT OF THE INVESTMENT ON PROTECTED AREAS | 13 |
| 7. HAZARDS RELATED WITH THE IMPACT ON LIVING CONDITIONS AND HUMAN HEALTH | 14 |
| 8. WASTE MANAGEMENT | 15 |
| 9. TRANS-BORDER IMPACT | 17 |
| 10. RISK OF SOCIAL CONFLICTS | 17 |
| 11. DESCRIPTION OF EXPECTED MEASURES TAKEN TO PREVENT, LIMIT OR COMPENSATE FOR NEGATIVE ENVIRONMENTAL IMPACT | 17 |
| 11.1. LANDSCAPE, GROUND SURFACE, CLIMATE | 18 |
| 11.2. GROUND AND SURFACE WATER | 19 |
| 11.3. FLORA AND FAUNA | 20 |
| 11.4. AIR | 28 |
| 11.5. NOISE EMISSION..... | 28 |
| 12. SPECIFICATION OF ASSUMPTIONS FOR NECESSARY STUDIES OF IDENTIFIED MONUMENTS IN THE AREA OF THE PLANNED UNDERTAKING DISCOVERED DURING THE CONSTRUCTION WORKS | 29 |
| 13. LIMITED USE AREA | 29 |
| 14. SUGGESTED MONITORING | 30 |
| 15. SUGGESTED SCOPE OF THE POST-IMPLEMENTATION ANALYSIS | 30 |
| 16. FINAL CONCLUSIONS | 30 |
| 17. APPENDICES | 31 |

1. General information

The considered undertaking consists in the construction of the Puławy Ring Road (Stage II) in the line of the S12 Expressway: A1 (Piotrków Trybunalski) – Sulejów – Radom – Puławy – Kurów – Lublin – Piaski – Chełm – Dorohusk – national border (Kiev).

The investment has been included in a group of undertakings of a potentially considerable environmental impact for which an environmental impact report is mandatory, according to § 2, sec. 1, item 29 of the Ordinance of the Council of Ministers of 9 November 2004 on determining the types of project that may have a considerable impact on the environment and on the detailed conditions related to qualifying the project for drawing up an environmental impact report (Journal of Laws No. 257, item 2575 as amended). The report is prepared as an appendix to the application for a decision on environmental consideration of the consent to carry out the undertaking. (Act of 27 April 2001 – Environmental Protection Law, Journal of Laws of 2008, No. 25, item 150 as amended, Act of 3 October 2008 on providing access to information concerning the environment and environmental protection, participation of the public in environmental protection and on environmental impact assessments, Journal of Laws No. 199, item 1227 of 2008, Act on the amendment of the Environmental Protection Act and certain other acts of 3 October 2008, Journal of Laws No. 201, item 1237).

The undertaking is a follow-up of the investment consisting in the construction of the Puławy Ring Road in Stage I commissioned in July 2008. At the stage of initial analyses of the first stage of the Puławy Ring Road performed in 1995-1997 two variants were considered: a northern one and a southern one. The northern variant assumed that the ring road would bypass the city centre from the north, running in the line of Długa Street through a wood separating the city centre from the Azoty industrial district, a location of a large chemical (nitrogen) plant. The southern variant assumed bypassing the city centre from the south, but it was rejected at the stage of design works due to a serious collision with the Kazimierz Landscape Park almost reaching the city centre from the south. The next design stages in 1998-2004 considered only the northern variant of the Puławy Ring Road in Stage I. This resulted from the fact that the northern variant of the ring road was the only location of the road acceptable with regard to the collision with areas of environmental and landscape protection. This formed the basis for the designation of the route for Stage I of the ring road. The performance of this undertaking included the construction of the northern ring road of the city and the availability of the main roadway of the new road was limited by new interchanges for transit traffic to bypass the city centre. However, the undertaking at Stage I was completed at routing the traffic out from the bridge crossing to Puławy where the transit traffic is still routed through the eastern outskirts of the city. Only the completion of the second stage from Tysiąclecia Państwa Polskiego Street to the Sielce Interchange at the connection with Road No. 17 (Warsaw – Lublin) will allow relieving the transit traffic in the eastern part of the city and releasing the complete functional effect of the investment at Stage I and the current stage (II).

The planned section of the ring road is located in the city of Puławy and communes of Puławy and Końskowola in the Puławy powiat, Lubelskie Voivodeship. In its current condition, national road no. 12 (**Variante 0**) runs through the centre of Puławy and through Końskowola and Kurów. Currently the road runs in the direct vicinity of residential housing, commercial facilities, schools and other public utility buildings and is a source of great nuisance related to the traffic, including noise, exhaust gases and transport vibrations and a potential safety risk for traffic participants due to its structure and daily intensity. Moreover, considering **Variante 0** it needs to be taken into account that the technical possibilities of protecting residents against excessive impact of traffic with regard to the air contamination and noise level caused by the traffic (numerous access roads to land plots prevent using efficient sound screens) in these towns have been exhausted. The current traffic system allowing for the connection of individually used land plots with the national road is impermissible for an expressway. In such case the route can be accessed only through interchanges supported by parallel access roads. The forecast increase in traffic intensity,

and thus, its impact on the residents, homestead habitats, multi-linear residential buildings, towns adjacent to national road no. 12 with regard to the noise impact, will increase significantly.

It is not possible to adjust the existing national road no. 12 with its current course to the parameters of an expressway without a significant interference with the current developments and demolishing linear (multi-linear) dense developments in the town. It is not possible to use technical mitigation measures for reasons stated above to secure the areas intended for development, multi-family and communal residential developments, homestead housing, residential and commercial areas and others listed in the Ordinance of the Minister of the Environment of 14 June 2007 (Journal of Laws 120, item 826) situated along the existing national road no. 12 against the impact of traffic. Thus, it is necessary to route the S12 road outside the area of dense residential development in towns that it runs through and at the same time route the expressway through the protected areas of the lowest possible sensitivity to the impact of such investment.

Four variants of Stage II of the Puławy Ring Road (apart from Variant **0**) were pre-considered: **A, B, C** and **D**. All variants of the route are related with the works performed at Stage I of the ring road construction. These variants were characterised as follows:

– **Variant A.**

This variant is most compliant with the current Local Spatial Development Plans. On the initial section the route runs in the northern part of Natura 2000 PLH060055 PUŁAWY area, and further through a forest area and land used for agricultural purposes. At the level of Sielce village the route runs through extensively used lowland and mountain fresh meadows (6510). The route transversely crosses the developments of Młynki village (in collision with the development) dividing the village in two.

- **Nature reserves**

The Nature Reserve of Czaplinię k. Gołębia is situated approx. 10 km from the designed corridor of national road no. 12 in the north-western direction.

- **Natural monuments**

The investigation performed during the current design works did not show any natural monuments within the direct vicinity of the designed corridor of national road no. 12.

- **Sites of ecological interest**

The investigation performed during the current design works did not show any natural monuments within the direct vicinity of the designed corridor of national road no. 12.

- **Protected Landscape Areas**

The Kozi Bór Protected Landscape Area. The final section of the ring road, Variant A; the connector roads at the Sielce Interchange run approx. 150-300 m from the borderlines of the area without any interference.

- **Protection of monuments**

The designed national road no. 12 on the discussed section does not run in the vicinity of facilities entered in the register of monuments.

- **Archaeological sites**

In the impact area of the designed national road no. 12 there are archaeological sites registered in the Archaeological Image of Poland performed at the beginning of the 1980s (Nos. 73-76 and 73-77).

– **Variant B.**

This variant is a modification of Variant **A**. At the level of Młynki village the route runs without any collision with the existing homestead developments of the village. At the same time, as a result of arrangements and public consultations the Końskowola Interchange was planned at the cross-section with powiat road no. 2507L.

- **Nature reserves**

The Nature Reserve of Czaplinię k. Gołębia is situated approx. 10 km from the designed corridor of national road no. 12 in the north-western direction.

- **Natural monuments**

The investigation performed during the current design works did not show any natural monuments within the direct vicinity of the designed corridor of national road no. 12.

- **Sites of ecological interest**

The investigation performed during the current design works did not show any natural monuments within the direct vicinity of the designed corridor of national road no. 12.

- **Protected Landscape Areas**

The Kozi Bór Protected Landscape Area. The final section of the ring road, Variant B; the connector roads at the Sielce Interchange run approx. 150-300 m from the borderlines of the area without any interference.

- **Protection of monuments**

The designed national road no. 12 on the discussed section does not run in the vicinity of facilities entered in the register of monuments.

- **Archaeological sites**

In the impact area of the designed national road no. 12 there are archaeological sites registered in the Archaeological Image of Poland performed at the beginning of the 1980s (No. 73-76 and 73-77).

– **Variant C.**

The route according to Variant **C** runs through the PLH060055 PUŁAWY Natura 2000 Area from the town of Puławy to Młynki village where it joins Variant **B**. With regard to Variants **A** and **B** the section running through the Natura Area is longer by approx. 3 km and the occupied feeding area of the greater mouse-eared bat will increase from 23 to 58 ha. Moreover, there will be an additional collision with the following areas: extensively used lowland and mountain meadows (6510), oak-hornbeam forests (9170) – 1.7 ha, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (91E0) – 1.2 ha.

- **Nature reserves**

The Nature Reserve of Czapliniec k. Gołębia is situated approx. 10 km from the designed corridor of national road no. 12 in the north-western direction.

- **Natural monuments**

The investigation performed during the current design works did not show any natural monuments within the direct vicinity of the designed corridor of national road no. 12.

- **Sites of ecological interest**

The investigation performed during the current design works did not show any natural monuments within the direct vicinity of the designed corridor of national road no. 12.

- **Protected Landscape Areas**

The Kozi Bór Protected Landscape Area. The final section of the ring road, Variant C; the connector roads at the Sielce Interchange run approx. 150-300 m from the borderlines of the area without any interference.

- **Protection of monuments**

The designed national road no. 12 on the discussed section does not run in the vicinity of facilities entered in the register of monuments.

- **Archaeological sites**

In the impact area of the designed national road no. 12 there are archaeological sites registered in the Archaeological Image of Poland performed at the beginning of the 1980s (No. 73-76 and 73-77).

– **Variant D.**

Variant **D** runs through the Natura Area similarly to Variants **A** and **B**. Due to the necessity of ensuring transport services for the Puławy Nitrogen Plant the Azoty Interchange planned for this variant introduces an additional collision with the Natura Area and the Kurówka River which has a non-regulated and picturesque course in this area. Additionally, the planned interchange interferes with high multi-family developments of the Plant's residential area. The location of the interchange collides with the existing transport and technological system of the plant. The plant has an organised transport system arranged in line with the manufacturing technology. A vast interference with the system will greatly

disrupt the transport services for the plant. An extensive interference with the dense forest complex and agricultural land further along the road. Apart from the Natura Area the route crosses: the complex of habitats: 2330 Inland dunes with open *Corynephorus* and *Agrostis* grasslands and 6120: semi-natural dry grasslands (Festuco-Brometalia) – priority habitat and extensively used lowland and mountain meadows (6510). Within the borderlines of 2330 and 6120 habitats (2.3ha) it approaches the area of European dry heaths (4030).

- **Nature reserves**

The Nature Reserve of Czapliniec k. Gołębia is situated approx. 10 km from the designed corridor of the national road No. 12 in the north-western direction.

- **Natural monuments**

The investigation performed during the current design works did not show any natural monuments within the direct vicinity of the designed corridor of national road no. 12.

- **Sites of ecological interest**

The investigation performed during the current design works did not show any natural monuments within the direct vicinity of the designed corridor of national road no. 12.

- **Protected Landscape Areas**

The Dolny Wieprz Protected Landscape Area. The final section of the ring road, Variant D, the connector road at the Żyrzyn Interchange, crosses the borderline of the area at a distance of approx. 150-300 m, slightly disturbing its surface.

- **Protection of monuments**

The designed national road no. 12 on the discussed section does not run in the vicinity of facilities entered in the register of monuments.

- **Archaeological sites**

In the impact area of the designed national road no. 12 there are archaeological sites registered in the Archaeological Image of Poland performed at the beginning of the 1980s (No. 73-76 and 73-77).

As a result of a comprehensive, multi-criteria analysis, Variants A and B, characterised by the most advantageous course with regard to the impact on the existing natural environment, using the corridors of existing access roads to the nitrogen plant and existing poviát road, were accepted. Moreover, in these variants the Azoty Road Interchange is connected with the cross-section with the Warsaw - Lublin - Kiev railway line, thus decreasing the area of accumulated impact to a minimum. In Variants C and D the Azoty Interchange is at a distance of approx. 0.5 km from the railway line. Also, for transport-related reasons, Variants A and B were considered most advantageous.

2. Location and parameters of the undertaking

The final variants of the road considered in the environmental analysis are as follows:

VARIANT A

The route of the planned ring road runs as follows:

- section from km 11+050.00 to km 12+388.02.

The planned scope of works (extending the existing roadway with the right roadway) is located within the roadway designated for the ring road.

- section from km 12+388.02 to km 12+617.56.

The ring road uses the road along Długa Street without using the structural elements of the existing street.

The adjacent area is forest land.

- section from km 12+617.56 to km 14+300.00.

The ring road runs through a forest complex on the southern side of the existing Tysiąclecia Państwa Polskiego Avenue and existing company road of the Puławy Nitrogen Plant without using the existing roads.

- section from km 14+300.00 to km 15+751.80 (Michałówka Interchange).
The ring road uses the company road of the Puławy Nitrogen Plant without using the structural elements of the existing road.
The adjacent area is forest land.
- section from km 15+751.80 (Michałówka Interchange) to km 16+200.00.
The ring road uses poviát road no. 2505L without using the structural elements of the existing road. The adjacent area is forest land.
- section from km 16+200.00 to km 17+185.00.
The ring road runs through the forest complex on the northern side of existing poviát road no. 2505L without using the existing road.
- section from km 17+185.00 to km 24+168.10.
The ring road runs through agricultural land.

Due to the method of road recording, the end of the planned section is at the crossing of the ring road and existing national road no. 17 (Warsaw – Lublin, towards Warsaw) at km 23+096.63. The total scope of the paper, on the other hand, is at km 24+168.10 (including the connector road of the Sielce Interchange).

The length of the Puławy Ring Road section according to Variant **A** – 10.71 km.

VARIANT B

The ring road route for this variant was designed collision-free with regard to Młynki village developments routing it along the edge of the village and slightly interfering with the area of a horticultural farm.

At the same time, as a result of consultations and arrangements at the cross-section with national road no. 2507L an interchange ensuring convenient connection of Końskowola commune with the S12 expressway is planned.

As compared to Variant **A**, Variant **B** has the following differences with regard to the design solutions:

- at the section from km 16+500 to km 18+500 the ring road bypasses the development of Młynki village,
- the Końskowola Interchange is planned at the cross-section of the road with poviát road no. 2507L (km 20+122.06).

Due to the method of road recording, the end of the planned section is at the crossing of the ring road and existing national road no. 17 (Warsaw – Lublin, towards Warsaw) at km 23+0160.05. The total scope of the paper, on the other hand, is at km 24+187.82 (including the connector road of the Sielce Interchange).

The length of the Puławy Ring Road section according to Variant **B** – 10.77 km. The location of individual variants of the ring road is presented in Appendix 1.

The basic technical parameters of the ring road:

- technical road class – S (expressway),
- design speed – $V_p = 100$ km/h,
- operating speed – $V_M = 110$ km/h
- cross-section type – mainline (basic section),
- number of roadways – 2
- number of lanes – $2 \times 2 = 4$,
- lane width – 3.50 m,
- roadway width – 2×7.00 m

- emergency lane width – 2 × 2.50 m,
- ground shoulder width – 1.75 m,
- width of the dividing lane – 5.00 m (including hardened belts – 2 × 0.50 m),
- vertical clearance - 5.00 m,
- traffic category – KR6,
- pavement load – 115 kN/axle.

3. Environmental elements within the undertaking

Geological structure

The area of the planned investment is situated on the edge of the Lubartów Plain which is a part of the Southern Podlasie Lowland and the Nałęczów Plateau, a part of the Lublin Upland.

The Lubartów Plain reaches the height of approx. 130 to 181.5 m AMSL. It is dominated by post-glacial forms from the Wolstonian Stage. Among them, the largest area is occupied by mostly flat moraine upland made of glacial till.

The plains of fluvio-glacial accumulation made of sands and gravels are also limited. Individual culminations are formed by end moraines (e.g. Łysa Góra) with relative height up to 5m made of gravels and stones. The basic post-glacial landscape element is the valley system of the Kurówka; a main valley, mostly parallel, with valleys of its lateral, nameless tributaries.

The southern part of the area situated within the loess patch of the Nałęczów Plateau is characterised by different hypsometric and morphological relations. Its majority rises up above 190 m AMSL. A temporary landscape element between the top part of the Nałęczów Plateau and the low Lubartów Plain is a denudation plain forming an escarpment step; the surface gently sloping to the north (from approx. 170 to approx. 160 m AMSL) cutting post-glacial sediments of various ages and covered with a thin layer of dusts. Deep drill holes drilled through the formation of the Devonian, Carboniferous, Cretaceous, Tertiary and Quaternary. The Devonian is developed as limestone and dolomite formations. The Carboniferous sediments lie inconsistently on the Devonian and are represented by clay stones, mudstones and sandstones. The upper Cretaceous is represented by marlstones and gyzes. Cretaceous sediments are found on the surface or close to the surface within the edge of the Vistula Valley. Tertiary formations are silts and loams. The formations on the surface are Tertiary sediments from the Pleistocene and Holocene. In general, the area of the ring road is formed of marsh and river formations (sands, organic clay muds and clays), river sediments (sandy gravel, gravel, sand), fluvio-glacial sediments (sand, glacial till), glacial and moraine sediments and glacial lake sediments (clay, silt).

Surface water

The designed section of the Puławy Ring Road, Stage II, is located in the catchment area of the Vistula River and its direct tributary, the Kurówka River. The catchment area of the Vistula to the Puławy Bridge is 57,263.6 km², and of the Kurówka River: 395.5 km².

The quality of water in the Vistula River at the measurement and control point in Puławy and the Kurówka River at the measurement and control point in Puławy in 2005 and 2006 corresponded to the purity class IV, i.e. poor.

Groundwater

The main aquifer is the Cretaceous level. The aquifers are cracked carbonate Maastrichtian formations (gyzes, marlstones, limestone, chalk). The water table of the Cretaceous level is tense and becomes stable at the depth of 0.5 to 60.0 m GL.

During the performance of drilling works groundwater of the Tertiary aquifer was found within the non-cohesive mineral and non-cohesive organic river ground in the area of the Kurówka River and in the non-cohesive ground of the fluvio-glacial accumulation in the area of a nameless course.

In the area of the Kurówka River the groundwater was drilled down to the depth of 1.5 to 1.7m BGL. The table was free, strictly connected with the water level in the Kurówka River. The area covered by the paper is within the MGWR No. 406, the Lublin Basin (Lublin) – a Cretaceous fractured-porous reservoir. It is an area of high water protection (OWO). The functional aquifer is found in the cracks and fractures of the Late Cretaceous. It is situated at a significant depth 70-90m BGL. The cretaceous rocks belong to the moderately and strongly permeable formations. According to the Rehse method, for these formations the thickness of the layer necessary for water purification is from 25 to 50 m. It may be assumed that drained rainwater is not a hazard to the protected water well-isolated from anthropogenic impact (The Report on Environmental Conditions in the Lubelskie Voivodeship – WIOŚ 2006). Thus, the planned undertaking has no impact on the quality of water in functional aquifers.

Mineral deposits

There are no documented deposits of minerals in the area of the planned Puławy Ring Road (Stage II).

Air

According to the available materials (including: Report on Environmental Conditions in the Lubelskie Voivodeship in 2004 – WIOŚ Lublin July 2005) presenting the assessment results of air condition in the Lubelskie Voivodeship in recent years, it may be concluded that the values of maximum levels of individual contaminants are much lower than the permissible values.

Acoustic climate

Noise measurements were performed to determine the acoustic background. The results and calculations showed that the permissible noise level is not exceeded only at one point (point no. 3), i.e. next to powiat road no. 2501L. At other points the noise levels are already exceeded before the construction of the ring road.

Animated nature

The planned investment includes a forest area located in the vicinity of the city and industrial areas and a part of the upland extensively used for agricultural purposes. The landscape has a significant impact on the species and populations of the fauna.

The mammals are typical for forest and agricultural areas of the Polish lowland.

The following species have been observed:

hedgehog *Erinaceus concolor*
mole *Talpa europaea*
fox *Vulpes vulpes*
hamster *Cricetus*
vulpes
raccoon dog *Nyctereutes procyonoides*
pine marten *Martes martes*
beech marten *Martes foina*
roe deer *Capreolus*
capreolus
wild boar *Sus scrofa*
hare *Lepus europaeus*
deer *Cervus elaphus*
Eurasian elk *Alces alces*

The main refuges of large ungulates can be found in the forest area of Puławy and the Kozi Bór complex. The avifauna of the forest areas is relatively poor.

In the area of the planned investment the following bat species have been observed:

listed in the Appendix 2 of DS:

greater mouse-eared bat (*Myotis myotis*) –
feeding area
Barbastelle *Barbastella barbastellus*

other:

Natterer's bat *Myotis nattererii*
particoloured bat *Vespertilo murinus*
serotine bat *Eptesicus serotinus*
common noctule *Nyctalus noctula*
brown long-eared bat *Plecotus auritus*
grey long-eared bat *Plecotus austriacus*

The flora is characterised by:

- species of all types of lowland forests (except for boggy forests);
- the group of meadow species is simplified, with a very low share of Molina meadows;
- no species of high and transitional peat bogs;
- medium, at times high (surrounding the nitrogen plant) share of foreign species;
- no species rarely observed in the Polish flora, low share of protected species.

Protected plant species

There are not many protected or rare species of plants in the area adjacent to the planned investment. The stands are concentrated mostly in the Kurówka River Valley and surrounding forests. These stands include the following species:

strict protection:

Broad-leaved Helleborine (*Epipactis helleborine*)

Turk's cap lily (*Lilium martagon*)

Prince's pine (*Chimaphila umbellata*)

wolf's-foot club moss (*Lycopodium clavatum*)

partial protection:

common ivy (*Hedera helix*)

European wild ginger (*Asarum europaeum*)

alder buckthorn (*Frangula alnus*)

blackcurrant (*Ribes nigrum*)

Protected areas

In the area of the planned undertaking, there is the established Kozi Bór Protected Landscape Area and Puławy PLH060055 Natura 2000 area.

The Kozi Bór Protected Landscape Area is located outside the project scope at a distance of approx. 200 m, from the facilities of the Sielce Interchange connecting the planned Puławy ring road with national road no. 17. It was established to maintain a large forest complex.

Both variants, A and B, of Stage II of the ring road construction at the section from km 12+388 to km 13+080 run through the Puławy Natura 2000 area. Moreover, from km 10+982 to km 12+388 there is the extended second roadway of Stage I of the Puławy ring road construction. At the section from km 13+080 to km 17+000 the planned ring road (Stage II, Variant A and B) runs approx. 400 m from this area.

According to the data in the Natura 2000 Standard Data Form on 1 August 2004 a Special Protection Area (SPA), PLH060055, the Puławy Children's Home, was established. It was a "spot area" including a building constituting a refuge for bats – the great mouse-eared bat (*Myotis myotis*).

The works aimed at determination of the location of the Puławy ring road construction (Stage I and II) accounted for the conditions mentioned above. The designed investment **did not collide** at that time with the PLH060055 area (the distance of the planned, and currently executed, investment from the "spot area" is at least 2.05 km). Moreover, the expressway was routed in the corridor of the existing company road to the Puławy Nitrogen Plant (Azoty) connecting the plant with voivodeship road no. 824 and Długa Street and further in the corridor of powiat road no. 2505L to Młynki village. This allowed decreasing the project's impact on forest areas.

On 17 January 2007 the Standard Data Form was updated with regard to the designation of new SPA borderlines. The purpose of the protection is to ensure living conditions for the largest breeding colony of the great mouse-eared bat *Myotis myotis* (approx. 350 females) in the Lublin area, located in the attic of the building (the Children's Home). The forest area is a feeding ground for the bats. Also, a large colony of the grey long-eared bat *Plecotus austriacus* was observed.

According to the attached maps, the completed (Stage I) and planned (Stage II) ring road has partially been placed in the Puławy PLH060055 Natura 2000 Area. The route of individual variants of the road with regard to this area was thoroughly analysed and considering the completion of Stage I construction, **it was determined that Variants A and B of Stage II could not be routed bypassing the borderlines of the Puławy Natura 2000 Area. Routing the completed one-roadway section of Stage I of the ring road towards the north to the borderline of the area next to the railway sidings would be associated with a significant interference with the developments of Wólka Profecka, the company**

housing district of Azoty. Elimination of the completed part of the ring road (regardless of the socially unacceptable costs) and restoring the road's corridor to the condition similar to the Natura Area would be time-consuming. Considering the superior public interest requiring the transfer of the burdensome transit traffic (noise, air contamination, vibrations, accident proneness) outside the municipal course of national road no. 12 and the very high social and economic cost of a change in the ring road's route, it must be concluded that it is necessary to continue Stage II with an insignificant interference with the Natura 2000 area. Variants A and B of the Stage II Puławy ring road are at the edge of the Natura 200 area where the quality of habitats is lower. The occupied area will be 6.5 ha out of 1156.97 ha, which is approx. 0.6% of the resources; an impact of no significant influence on the functioning of the area. Currently, the Stage I construction of the ring road has been completed: from Anielin (left side of the Vistula River) to the crossing with the Warsaw – Lublin railway line in Puławy.

4. Types and degree of environmental impact of the planned undertaking

The construction of the road may generate environmental impact whose scale and range with regard to both variants have been assessed in the report. The impact includes:

1. Permanent road structure situated on the land – decreasing the land surface and creating a discrepancy in the landscape

The road construction, which is a linear investment, will become a permanent part of the surroundings. Due to the richness of the landscape it will be necessary to transform the land through embankments and excavations. Also, at the locations of road crossings and interchanges elevated bodies of the crossing roads will be necessary.

The construction of the road along the new route will be associated with a noticeable impact on the ground and soil. The impact during the construction and later operation will be permanent land occupation for the body of the main road, as well as the technological and collector roads. The entire surface of the roadway is:

- in Variant A – 92.8 ha
- in Variant B – 92.9 ha

Due to the developments of Młynki village, Variant B is more acceptable.

2. Impact on climate in the area of the investment – evaluated as negligible for both variants of the road,

3. Possible disturbance of water relations and contamination of surface water

The construction of the road will change the water relations in the area only slightly. The natural directions of water flow are maintained by culverts and bridges.

The main contaminants in the road runoffs are suspensions and oil-derivative hydrocarbons. In general, the rainwater fulfils the requirements regarding permissible levels of these substances. Higher levels of total suspended solids may occur at the outlets of the rainwater sewage system.

The adopted rainwater drainage system, i.e.:

- at the initial section (up to km 12+861) to the rainwater sewage system and through pre-treatment devices to the Kurówka River.
- on the remaining section through roadside ditches (grass-covered, high mown) which become grass infiltration ditches at the final section

secures the surface water and groundwater against contamination both in Variant A and B.

5. Impact on flora and fauna

The proposed variants of the ring road will have a similar impact on rare species of plants and animals, as well as habitats.

The main hazard for the flora and fauna is a direct impact during the period of executing the undertaking. In this period, as a result of a direct collision or the performance of works the quality of habitats may slightly deteriorate.

6. Impact of the investment on protected areas

Variant A and Variant B

No significant impact on the Kozi Bór PLA, no collision.

Variants A and B

No significant impact on the Puławy PLH 060055 Natura 2000 Area.

Due to the insignificant (6.5 ha out of 1156.97 ha of the total surface) entrance of the ring road into the borderlines of the Puławy SPA and route of Stage I of the ring road (construction to be completed), as well as considering the superior public interest it was decided to recommend Variant B.

The superior public interest, in this case, is associated with:

- The necessity of routing burdensome transit traffic (noise, air contamination, vibrations, accident-proneness) out of the municipal part of the current national road no. 12 (Puławy, Końskowola, Kurów)
- The very high social and economic cost of adjusting the current course of national road no. 12 to the standards of a technical and environmentally safe expressway. This would require demolishing at least two lines of the existing developments adjacent to the road in Puławy, Końskowola and Kurów.
- The very high social and economic cost of a change in the course of the ring road due to the completion of construction in Stage I (section of 12.383 km with a bridge over the Vistula River of approx. 1.0 km)

An analysis of the history of establishing the ring road location and current completion of construction works at Stage I indicate that **it is not possible to route the road without a minimal, insignificant collision with the Puławy Natura 2000 SPA** for the following reasons:

1. Planning works for the course of the national road constituting the Puławy ring road were performed until the mid-1990s and finished at the beginning of 2003. At the stage of initial analyses of the course of the Puławy Ring Road performed in 1995-1997 two variants were considered: a northern one and a southern one. In the northern variant it was assumed that the ring road starting in the area of Anielin would bypass the city centre from the north going along the line of Długa Street through the forest separating the city centre from the Azoty Chemical Plant. In the southern variant it was assumed that the ring road starting in the area of Anielin would bypass the city from the south behind Włostowice, but this variant was rejected at the stage of design works due to a collision with the Kazimierz Landscape Park. Currently, the southern variant would additionally collide with the PLH Małopolska Vistula River Gorge Natura 2000 Area. SOOPLH 060055 Puławy Children's Home was marked as a "spot area" on 1 August 2004 and its distance from the northern route of the ring road was 2.05 km. On 17 January 2007 the area was extended and the now-completed section of

Stage I from km 10+982 to km 12+388 became a part of its north-western edge.

2. The construction of the ring road at Stage I (Stage II, Variants A and B) must begin at km 12+388 and to km 13+080 it will run along the north-eastern edge of the area, as it is technically impossible to change the route of an expressway at such short section, at the same time ensuring the services for the nitrogen plant, without demolishing the completed works from the Dęblińska Interchange to the Azoty II crossing or largely occupying the developments of Wólka Profecka.
3. The existing transport system of Długa Street and the company road to Azoty are within the borderlines of the area and the ring road has been routed within the corridor of these roads, thus minimising the impact of the undertaking on the area.

7. Hazards related with the impact on living conditions and human health

7.1. Contamination of air as a result of exhaust gases which, according to the calculations, exceed the permissible standards only within the borderlines of the planned roadway.

7.2. Noise emission – the calculations indicate that on the borderline of the roadway the noise level exceeds 60 dB by day and 50 dB at night. However, the analysed section of the ring road almost entirely runs through areas of no acoustic protection. The only collision occurs in Młynki where there are areas of residential developments (homestead developments). The calculations show that the suggested acoustic screen will allow noise to be decreased to permissible levels. The attached graphics 2 show the course of equal-loudness contours 50 and 60 dB for 2012 and 2025. **Importantly, air contamination and noise emission were assessed for the planned ring road including the existing roads.**

Due to that, Variant B is more favourable.

At the same time, the positive effect of executing the investment with regard to these impacts for the area directly adjacent to the existing course of the national road through the towns of Puławy, Końskowola and Kurów must be indicated. As a result of the investment, the health and living conditions will improve for approx. 1,500 residents of Puławy, 400 residents of Końskowola and 300 in Kurów.

8. Waste management

The waste generated at the stage of executing the road investment shall be removed or managed by the contractors. The waste generator (the contractor of construction works) may also outsource waste management to another waste owner. Execution stage – the following types of waste may be generated:

15 01 – packaging waste (including selectively collected municipal packaging waste) – 0.1Mg/year,

- 17 01 01 – concrete waste and concrete debris from demolitions and repairs – 130 m³,
- 17 01 81 – waste from the renovation and reconstruction of roads (stone aggregate, possibly granite brick) – 10,000 m³
- 17 03 02 – bituminous and asphalt mass from the surface - 210 Mg/year,
- 17 04 05 – iron and steel - 2 Mg/year,
- 17 02 01 - wood – 0.5 Mg/year,

- 17 01 02 – brick debris - 4 Mg/year
- 17 03 80 – tar waste 3 Mg/year
- 17 01 03 – other ceramic materials and equipment items – 2 Mg/year,
- 17 04 07– metal mixtures (protective barriers, net fencing, steel culverts) – 4 Mg/year.

The waste (apart from 15 01) is generated mostly at the sites of executing connections with the existing national road No. 12 and on crossings with existing poviats and voivodeship roads.

Part of the waste generated at the construction site may be used in works performed at the site (e.g. for land levelling) or as recyclable materials (scrap metal). Waste that cannot be used will require storage, sale or utilisation by a specialist company.

The waste from the demolition of buildings may include hazardous waste containing asbestos, especially insulating materials containing asbestos (17 06 01*). Due to its properties, asbestos is especially hazardous to people and the environment at the moment of crushing. Thus, the asbestos-containing elements, i.e. asbestos and cement materials should be removed, packed and transported to designated storage locations by specialist companies with specially trained staff.

The waste generated during the operation should be collected and periodically handed over to specialist companies for neutralisation. Waste considered hazardous should be treated according to the provisions of the Act of 27 April 2001 on Waste (consolidated text of 2007, Journal of Laws No. 39, Item 251z, as amended). Residues from sedimentation tanks for total suspended solids should be removed, transported and utilised or stored by a specialist company authorised to perform such operations.

The following waste will be generated at the stage of operation:

- non-segregated municipal waste from the passenger service points and generated as a result of waste being thrown out of moving vehicles 20 03 01 – 0.5 Mg/year
- paper and cardboard 19 12 01 – 1 Mg/year
- plastics 16 01 19 – 1 Mg/year
- glass 16 01 20 – 2 Mg/year.

The waste should be collected by the road's administrator, collected selectively and gradually removed to a waste storage yard.

Moreover, the following waste will be generated as a result of road maintenance:

- used mercury-containing light sources 16 02 13* - 0.2 Mg/year
- used light fixtures 16 02 16 – 0.3 Mg/year
- content of sand traps 19 08 02 (deposits from rainwater tanks) – 5 Mg/year

collected by a specialist company with an appropriate permit.

Waste, including hazardous waste may also be generated as a result of accidents or chance events. The following waste may be generated:

- showing hazardous properties 16 81 01* – 0.3 Mg/year not showing hazardous properties 16 81 02 – 0.8 Mg/year

The waste is to be collected by a specialist company.

Pursuant to Art. 17, section 1 of the Act on Waste the waste generator shall:

- obtain a decision approving the hazardous waste management programme, if hazardous waste in amounts exceeding 0.1 Mg/year is generated;
- submit information on the generated waste and methods of managing the generated

waste, if it generates hazardous waste up to 0.1 Mg a year or more than 5 Mg a year of waste other than hazardous.

- pursuant to Art. 19, section 1 of the Act on Waste, two months before undertaking activities generating hazardous waste, the waste generator shall submit an application for approval of the hazardous waste plan in the case that such waste is generated to a competent authority of environmental protection. The application shall specify the timeframe of the activity generating hazardous waste. For the remaining waste the waste generator shall submit information on the generated waste and method of its management to a competent authority of environmental protection within 30 days before commencing the waste-generating activity.

Moreover, according to the Act on Waste the Contractor of works shall:

- collect all generated waste in a selective manner,
- ensure proper management of hazardous waste, if such is generated,
- strive to minimise the amount of waste and its maximum economic use,
- organise the construction site and construction material facilities in compliance with the requirements of environmental protection, EHS and fire protection.

The handing-over of waste to other owners must be documented on a Waste Handover Sheet.

9. Trans-border impact

The trans-border environmental impact for the undertaking is impossible due to the distance of the undertaking from the nearest EU border with Ukraine and Belarus which is approx. 150 km. The range of the undertaking's impact of trans-border significance is, in fact, limited to the roadway, in the case of air contaminants, whereas for the noise at a distance of no more than 100-200 m from the edge of the expressway's roadway. Similarly, the impact of contaminants of rainwater and meltwater generated as a result of traffic on the planned expressway will not cause trans-border impact on the groundwater and surface water of Ukraine or Belarus due to the surface of the Bug River catchment area and the use of necessary pre-treatment devices on outlets of the local road rainwater sewage system preventing the penetration of excessive, uncontrolled contaminants into the environment.

10. Risk of social conflicts

The currently applicable regulations (especially with regard to environmental protection) ensure the community's participation in the proceedings with the participation of the community. Everyone has the right to submit remarks and applications in these proceedings.

At the stage of launching the process of investment preparation the Investor, the General Directorate of National Roads and Motorways, organised public consultations to identify the needs of local communities related with the planned investment.

The consultations consisted in displaying the design materials in offices of local administrative authorities with relevant announcements in the press and on the website of the Lublin Branch of the General Directorate of National Roads and Motorways. Additionally, information meetings with local governments, various institutions and residents were conducted. The presented remarks and requests are mostly taken into consideration in the design documentation.

As a result of the public consultations, a number of remarks, opinions and suggestions with regard to the proposed design solutions were submitted.

It is expected that social conflicts may arise in the case of this investment. The important reasons include: routing the road along a new line, the road running directly through or near developments and a residential area to be demolished in each variant.

11. Description of expected measures taken to prevent, limit or compensate for negative environmental impacts

The Environmental Protection Law Act states that transport lines shall be routed and executed in a way to ensure limitation of their environmental impact, including the protection of landscape value and possibility of movement for wild animals. The performance of an investment depends on the economical use of land during the preparation and execution of the investment. The Investor shall provide environmental protection during the construction works at the construction site, including the protection of soil, greenery, natural topography and water relations. It is permitted to use and convert natural elements only in so far as is necessary in the execution of a particular investment. It is necessary to undertake activities aimed at repairing damage and performing natural compensation activities if the protection of natural elements is not possible.

The forecast activities that may prevent, limit or compensate for the negative environmental impact are presented below.

11.1. Landscape, ground surface, climate

The following are indicated as the basic activities protecting the landscape, land surface and climate:

- **Harmonious introduction of road structures into the landscape** by designing the site and height plan in reference to the configuration of the existing land. Long sections of high embankments and deep excavations should be avoided, if technically possible.
- **Use of technical solutions minimising the occupied land surface**, especially requiring the removal of the biologically active surface (of forests, fields, meadows).
- **Limiting the scope of any ground replacement** to cases where it is impossible to use other methods of reinforcing a road or bridge structure. Appropriate solutions shall be included in further stages of the design.
- **Maximum limitation of impact during construction** by using technological roads located within the planned roadway, optimisation of transport work and proper organisation of works,
 - **Careful reclamation (in line with the type of land) for areas interfered with during the works** and located outside the planned roadway. At the same time, proper biological development of embankments and excavations of the ring road. The biological development of areas within the planned roadway should be performed with species of plants intended for the vicinity of roads and sufficiently resistant to the nuisance related with exhaust gases, nature of rainwater and meltwater, winter maintenance agents etc. The selection of plant species should be performed within the greenery design, taking into account the location of plantations with regard to the finally designed road elements. The selection of species should be based on the origin criterion: due to the protected area, only local species (or possibly forms and varieties thereof) should be used. Due to the potential invasive character of foreign species, they should be excluded. The species most often used for plantings within a roadway include: lime, maple, ash, sycamore and elm.
 - To minimise the negative impact of the undertaking on the ground surface and soil, appropriate technological orders shall be maintained, appropriately securing the work site, sealing the surface of bases and construction site facilities. The use of heavy equipment on areas not covered by the undertaking should be avoided.
 - During the construction a soil layer of 20-30 cm in thickness should be removed from the area of planned ground works to protect the humus layer. The humus should be used to form the permanent biological lining of escarpments, ditches, embankments, excavations or to thicken the existing soil later on other, less fertile areas.
 - The turf and humus should not be stored, but transported and used in another location directly.
 - In the case that it is necessary to store turf, in the vegetative period storage in heaps should not be longer than 2 weeks. If stored for longer periods of time, the turf should be spread and systematically watered.

Humus heaps should not be larger than 1.20 m and if stored for more than 2 weeks, the surface of heaps should be secured against water and wind erosion. It is recommended to sow grass, cereal or the fabacea around the heaps.

11.2. Surface water and groundwater

The following activities are used to protect surface water and groundwater and maintain water relations in an area:

- **Construction of bridges and culverts in places of existing water courses,**
- **Construction of a road water drainage system to ensure the pre-treatment of water to enable its removal to receiving reservoirs.** The basic and sufficient

method of pre-treating water from total suspended solids is the use of grass ditches. In certain cases, it is planned to use pre-treatment device sets. This applies to outlets of sectional rainwater sewage systems drained directly to the receiving bodies and thus not treated in a natural manner in ditches. Due to the possibility of uncontrolled leaks of hazardous substances (e.g. from road disasters or accidents) manual or mechanical valves closing the outflow of hazardous substances should be installed on outlets of pre-treatment devices.

- **The performance of construction works related with the undertaking ensuring the protection of surface water and groundwater:** elimination of sewage from construction machines and devices, piling for the foundation of bridge supports in a way to prevent contamination of groundwater, ground replacement to ensure the level of groundwater outside the roadway not changed in a significant manner after the construction.
- Devices for the protection of surface water against rainwater and emergency runoff of toxic substances from a failure or road accident (leaks of hazardous substances from tankers) should be fitted with emergency valves. Their purpose is to control hazardous substances from tankers.

A quality analysis of the rainwater drained from the roadway performed in the report in line with these considerations showed that the level of oil-derivative hydrocarbons would be below the permissible value (15 mg/l), and the indicator of total suspended solids would be:

Table 2. Value of total suspended solids at the outlet to the receiving body

| Section | Year 2012 | | Year 2025 | |
|---|-------------------|---------------------------|-------------------|---------------------------|
| | Raw sewage [mg/l] | Pre-treated sewage [mg/l] | Raw sewage [mg/l] | Pre-treated sewage [mg/l] |
| To the Michałówka Interchange | 98.00 | 41.2 | 116.7 | 49.0 |
| Michałówka Interchange - Sielce Interchange | 85.50 | 35.9 | 120.9 | 50.80 |

11.3. Flora and fauna

- Impact of the undertaking

The impact of the undertaking on Natura 2000 areas and other forms of area protection is presented in the table below. The enclosed drawing (vol. III, appendix 3) presents a map of natural values with the variant course of the road marked and borderlines of individual areas and results of the environmental inventory. Due to the fact that Variants A and B in the vicinity of protected areas are identical, in the tables below they are considered jointly, assuming their identical form and intensity of impact.

Table 3. Impact of the investment on nearby protected areas

| No. | Evaluation criteria | Variant 0 | Variants A and B |
|------------|---|--|--|
| 1. | Possible direct, indirect or secondary impact of the undertaking on the Natura 2000 area and other protected areas | | |
| 1a. | Range and scale | | |
| | Puławy PLH060055 | Direct, the road crosses the area at a length of 4.9 km | Direct, the investment crosses the area at a section from km 10+988 to 13+080, and at a section from 13+080 to 17+000 runs in the vicinity of the area |
| | Kozi Bór PLA | Distance from southern borderlines of the area is 1.9 km | Indirect, Sielce Interchange, DK 12/17, approx. 200 m from the borderline of the area |
| 1b. | Area occupation | | |
| | Puławy PLH060055 (1156.97 ha) | 13.6 ha | 6.5 ha (0.56%) |
| | Kozi Bór PLA – 12681 ha | 0 | 0 |
| 1c. | Impact related with area occupation | | |
| | Defects and transformations of natural habitats | | |
| | Puławy PLH060055 | No impact | 6510 - Lowland and mountain hay meadows extensively used – defect of 3.5 ha (km 13+080 to 13+430) and a decrease in the habitat quality of approx. 5 ha; 9170 oak-hornbeam forests – a decrease in the habitat quality on approx. 1 ha in the direct vicinity of the area |
| | Kozi Bór PLA | No impact | 9170 oak-hornbeam forests – a decrease in the habitat quality on approx. 12 ha (Sielce Interchange) |

| | | | |
|--|--|---|---|
| | Plant species | | |
| | Puławy PLH060055 | No impact | Possible damage of one stand of liliun martagon |
| | Kozi Bór PLA | No impact | No impact |
| | Animal species | | |
| | Puławy PLH060055 | | |
| | Great mouse-eared bat <i>Myotis myotis</i> and other species of bat | Decrease in feed base | executional phase – no disruptions due to the nocturnal activity of animals operational phase – insignificant decrease of the feed base |
| | Large copper <i>Lycaena dispar</i> Dusky large blue <i>Maculinea nausithous</i> | No impact | executional and operational phase – no disruptions |
| | Protected species of birds and reptiles | Increased mortality at a section of 4 km | executional phase: disruptions during the construction related with hindered movement; operational phase – insignificant decrease of living space (humid habitats by approx. 9 ha) |
| | Protected species of birds | decreased quality of habitats – decreased feeding surface, decreased number of potential nesting sites by 4%, increased noise level | executional phase – disruptions at the construction phase due to the noise, emissions, earthworks (startling); operational phase: decreased quality of habitats – decreased feeding surface, decreased number of potential nesting sites by no more than 1%, increased noise level |
| | Kozi Bór PLA | | |
| | Protected species of birds | No impact | executional phase – disruptions at the construction phase due to the noise, emissions, earthworks (startling); operational phase: insignificant decrease in the quality of habitats – decreased feeding surface, decreased number of potential nesting sites by no more than 0.1% |
| | Ecological corridors | | |
| | Puławy PLH060055 | hindered movement along the entire road, increased mortality | executional phase – hindered movement along the entire road; operational stage – limited movement of amphibians in the valleys of water courses and depressions (km 12+760, Michałówka Interchange, km 20+000 to 20+520, km 22+000) |
| | Kozi Bór PLA | No impact | No impact |
| | Visual landscape values | | |
| | Puławy PLH060055 | Introduction of an anthropogenic linear structure of 1,400 m from km 10+988 to 12+388 (complete Stage 1) | Introduction of an anthropogenic linear structure of 2,100 m (at a section from km 10+988 to 13+080; from km 10+988 to 12+388 completed Stage I) and a structure of 4,000 m in the vicinity of the area |

| | | | |
|-----------|--|---|---|
| | Kozi Bór PLA | No impact | Introduction of an anthropogenic linear structure in the vicinity of the area |
| 2. | Distance from the Natura 2000 area and other protected areas | | |
| | Puławy PLH060055 | Direct, the road crosses the area at a length of 4.9 km | The investment crosses the area at a section from km 10+988 to 13+080 (complete Stage I from km 10+988 to 12+388); from km 13+080 to 17+000 in the vicinity of the area (from 0 to 750 m) |
| | Kozi Bór PLA | Distance from southern borderlines of the area is 1.9 km | Sielce Interchange, DK 12/17, approx. 200 m from the borderline of the area |
| 3. | Emissions (removed: to the soil, water or air), noise, rainwater and meltwater, exhaust gases | | |
| | Puławy PLH060055 | High level of noise, exceed emissions of contaminants outside the roadway | Noise, exhaust gases within the roadway |
| | Kozi Bór PLA | No impact | Noise, exhaust gases within the roadway |
| | Resource requirements (consumption of water, electricity etc.) | | |
| | Puławy PLH060055 | Not applicable | Not applicable |
| | Kozi Bór PLA | Not applicable | Not applicable |
| 4. | Requirements related with excavation of earth masses | | |
| | Puławy PLH060055 | No impact | The planned undertaking will not contribute to the acquisition of earth masses from the Natura 2000 areas; only longitudinal and transverse movement of earth masses, local and supplied from external borrow-pits, is planned within the roadway. Borrow-pits will be at a significant distance from the construction site and Natura 2000 area. |
| | Kozi Bór PLA | No impact | Ditto. |
| 5. | Transport requirements: | | |
| | | No impact | No special transport requirements that would impact the Natura 2000 area and Kozi Bór PLA are expected in the construction and operation phases. During the construction the transport of earth masses, surface structures, structures of bridges and transport of auxiliary devices will be performed on technological roads within the planned lane of the expressway |

| | | | |
|-----------|---|----------------|------------------------|
| 6. | Duration of the construction, impact: periodical, continuous | | |
| | Puławy PLH060055 | Not applicable | 24 months – periodical |
| | Kozi Bór PLA | Not applicable | 24 months – periodical |

Table 4. Table of probable changes in the Natura 2000 area, resources and functioning of natural habitats and protected species

| | Evaluation criteria | Variant 0 | Variants A and B |
|------------|---|---|---|
| 1. | Description of probable changes in the characteristics of areas resulting from: | | |
| 1a. | Decreased surface of Natura 2000 areas | 13.6 ha out of 1156.97 ha | 6.5 ha out of 1156.97 ha (0.56%) |
| 1b. | Decreased surface of habitats | | |
| | 6510 - Lowland and mountain hay meadows extensively used | No impact | defect of 3.5 ha (km 13+080 to 13+430) in the direct vicinity of the area |
| | 91E0 alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) | No impact | No impact |
| | 9170 oak-hornbeam forests | No impact | decreased habitat quality on the surface of approx. 1 ha in the vicinity of the area |
| 1c. | Disruptions in the functioning of populations of key species | | |
| | Great mouse-eared bat <i>Myotis myotis</i> and other species of bat | insignificant decrease in feed base | executional phase – no disruptions due to the nocturnal activity of animals operational phase – insignificant decrease of the feed base |
| | Large copper <i>Lycaena dispar</i> Dusky large blue <i>Maculinea nausithous</i> | No impact | executional and operational phase – no disruptions |
| | Protected species of birds and reptiles | Increased mortality at a section of 4 k, | executional phase: disruptions during the construction related with hindered movement; operational phase – insignificant decrease in living space (humid habitats by approx. 9 ha) |
| | Protected species of birds | decreased quality of habitats – decreased feeding surface, decreased number of potential nesting sites by 4%, increased noise level | executional phase – disruptions at the construction phase due to noise, emissions, earthworks (startling); operational phase: insignificant decrease in habitat quality – decreased feeding surface, decreased number of potential nesting |

| | | | |
|------------|--|--|--|
| | | | sites by no more than 1%, increased noise level |
| | Protected plant species | No impact | Possible damage of one stand of liliium martagon |
| 1d. | Fragmentation of habitats or populations of species | | |
| | 6510 - Lowland and mountain hay meadows extensively used | No impact | fragmentation and decreased habitat quality on the surface of approx. 5 ha in the vicinity of the area |
| | 91E0 alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) | No impact | No impact |
| | 9170 oak-hornbeam forests | No impact | No impact |
| | Great mouse-eared bat <i>Myotis myotis</i> and other species of bats | Decrease in feed base | executional phase – no disruptions due to the nocturnal activity of animals operational phase – insignificant decrease in the feed base |
| | Large copper <i>Lycaena dispar</i> Dusky large blue <i>Maculinea nausithous</i> | No impact | executional and operational phase – no disruptions |
| | Protected species of birds and reptiles | hindered movement along the entire road, increased mortality | executional phase: disruptions during the construction related with hindered movement; operational phase – insignificant decrease in living space (humid habitats by approx. 9 ha) |
| | Protected species of birds | decreased quality of habitats – decreased feeding surface, decreased number of potential nesting sites by 4%, increased noise level | executional phase – disruptions at the construction phase due to noise, emissions, earthworks (startling); operational phase: insignificant decrease in the quality of habitats – decreased feeding surface, decreased number of potential nesting sites by no more than 1% |
| | Protected plant species | No impact | executional and operational phase – no disruptions |
| 1e. | Reduced density of species | Increased mortality of animals | No |
| 1f. | Changes to key indicators of protective value | Functioning of the area may be disrupted due to the operation of a linear investment (stage I of the investment) decreasing the area of free feeding of key species. There will be disruptions related with the barrier effect caused by increased traffic in the area, a significant increase in noise and emission of contaminants | Functioning of the area may be disrupted due to the introduction of a linear investment of 2,100 m in length decreasing the surface of protected habitats and the area of free feeding of approx. 7 ha. The area will continue to be available for birds, however, there will be some difficulties caused by the body of the road and vehicle traffic. There may be a disruption related with an increase in noise |

| | | | |
|------------|---|---|--|
| 1g. | Climatic changes | None | None |
| 2. | Description of impact on the Natura 2000 area as a whole due to: | | |
| | Interference with key relations shaping the structure in the area | Disrupted integrity of the area (fragmentation), decreased living and breeding surface (cf. 1c), fragmentation of the population – hindered movement (cf. 1d) | Disrupted integrity of the area (fragmentation), Defect of natural habitats related to their fragmentation (cf. 1b, d), decreased living and breeding surface (cf. 1c), fragmentation of the population – hindered movement (cf. 1d) |
| | Interference with key relations shaping the function of the area | Decreased possibilities of movement within the area (cf. 1d) | Creating a transverse barrier of 2,100 m decreasing the possibilities of movement within the area (cf. 1d), periodical changes (the construction phase) in water relations |
| 3. | Evaluation of impact range | | |
| | Decreased surface of Natura 2000 areas | 1 (very small) | 1 (very small) |
| | Decreased surface of habitats | | |
| | 6510 - Lowland and mountain hay meadows extensively used | 0 | 1 (very small) |
| | 91E0 alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) | 0 | 0 |
| | 9170 oak-hornbeam forests | 0 | 1 (very small) |
| | Disruptions in the functioning of populations of key species | | |
| | Great mouse-eared bat <i>Myotis myotis</i> and other species of bat | 1 (very small) | 1 (very small) |
| | Large copper <i>Lycaena dispar</i> Dusky large blue <i>Maculinea nausithous</i> | 0 | 0 |
| | Protected species of birds and reptiles | 2 (small) | 1 (very small) |
| | Protected species of birds | 2 (small) | 1 (very small) |
| | Protected plant species | 0 | 1 (very small) |
| | Fragmentation of habitats or populations of species | | |
| | 6510 - Lowland and mountain hay meadows extensively used | 0 | 1 (very small) |
| | 91E0 alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) | 0 | 0 |
| | 9170 oak-hornbeam forests | 0 | 0 |
| | Great mouse-eared bat <i>Myotis myotis</i> and other species of bat | 1 (very small) | 1 (very small) |

| | | |
|--|----------------|----------------|
| Large copper Lycaena dispar Dusky large blue Maculinea nausithous | 0 | 0 |
| Protected species of birds and reptiles | 2 (small) | 1 (very small) |
| Protected species of birds | 2 (small) | 1 (very small) |
| Protected plant species | 0 | 0 |
| Reduced density of species | 1 (very small) | 0 |
| Changes to key indicators of protective value | 2 (small) | 1 (very small) |
| Climatic changes | 0 | 0 |
| Description of impact on the Natura 2000 area as a whole due to: | | |
| Interference with key relations shaping the structure of the area | 2 (small) | 1 (very small) |
| Interference with key relations shaping the function of the area | 2 (small) | 1 (very small) |
| TOTAL | 18 | 13 |

Evaluation of impact on a 5-point scale, applies to the cells of item 3, table 17: from 0 (no impact) to 5 (high impact). The maximum score in the columns of item 3 in the table – 200

An analysis of impact on the Puławy PLH060055 Natura 2000 area indicates an impact of the planned investment in each of the analysed variants. The impact is significantly greater in Variant 0 than in Variants A and B (considered jointly due to the lack of differences in the vicinity of the area).

In the case of Variant 0 the impact is associated with a disruption to the integrity of the area – the existing barrier separating the area will be functionally extended (Stage I of the Investment and transfer of traffic from the centre of Puławy to Tysiąclecia Państwa Polskiego Avenue inside the Natura 2000 area). This will slightly decrease the feeding base of the key species – the barbastelle – and limit the possibility of movement for animals inside the area. A significant increase in traffic in the area will lead to greater mortality and reduction in the density of amphibians, reptiles and mammals. A decrease in the quality of natural habitats as a result of cumulative impact of contaminants penetrating the water and soils through the runoff from the road crown and as dry or wet deposits of air contaminants needs to be taken into consideration in the vicinity of Tysiąclecia Państwa Polskiego Avenue.

The impact of the investment in Variants A and B is identical due to the same route and lack of significant differences in other parameters of the road.

The impact applies mostly to the integrity of the area – the barrier effect (temporary and reversible) will be greater only at the stage of execution and elimination of the investment. Importantly, the course of the investment interferes with a protected area at the length of 2,100 m in the marginal part of the facility near the borderline in the vicinity of the nitrogen plant and the further course of the planned road is outside of the area. Considering the course of ecological corridors of various sizes in the landscapes near Puławy and function of the Natura 2000 area in this structure, the degree of interference in the functional integrity should be considered minor and insignificant.

The execution of the investment does not significantly change important

parameters of the habitat for the great mouse-eared bat, the species for which the area has been established. The size of the reproductive colony of the great mouse-eared bat in the attic of the Children’s Home in Puławy does not significantly change (UMCS, non-published data). The area protected as a Natura 2000 area is a feeding ground for this species (the bat hunts for insects moving at the bottom of forests and tree stands). The defect in the forest surface will be 23 ha (entirely outside the Natura 2000 area). With regard to the entire forest area north of Puławy this is less than 1% of the surface. At the same time, the character of occupied forests does not differ in nature and condition from other forests and thus, the defect can be considered very small and insignificant.

The course of both variants of the ring road does not cause significant impact. However, to mitigate the nuisance consisting in the division of migration belts for animals, a number of passages have been planned. The location and parameters have been agreed with the Puławy Forest Division and Hunting Clubs

| Location of the passage at approx. km | Description of passage |
|---------------------------------------|--|
| 13+623.80 | planned road culvert 2.00x1.50 m adjusted for B-category animals |
| 14+600.00 | planned large upper passage for animals adjusted for D-category animals of active width 36.5 m |
| 16+483.00 | planned road culvert 4.50x2.00 m adjusted for B-category animals |
| 16+979.06 | planned large lower passage for animals adjusted for C-category animals 16.0x4.19 m |
| 19+029.06 | planned road culvert 2.00x1.50 m adjusted for B-category animals |
| 22+024.14 | planned bridges on the nameless watercourse adjusted for C-category animals, 16.1x4.40 m |

It is planned that the expressway from (approx.) km 11+000 to km 17+200 (forest area) will be fenced on both sides, regardless of the height of embankments and depth of excavations. On the remaining section fencing will be performed next to the embankments, up to a height of 3.0 m, and all excavations. The detailed location of the fencing and method of connection with the development of passages for animals will be presented in the construction design. The culverts under the crown of the expressway on the section adjacent to the Kurówka River Valley (approx.) from km 12+500 to km 17+200 where there will be amphibian migration will be fitted with C-shaped guiding fences of 2x50 m on both sides of the road. The beds of water courses under bridges should not be reinforced with gabions.

11.4. Air

Due to the scope of impact of contaminants from the traffic (20-30 m from the road axis) indicated in the analysis and limited to the planned roadway, no measures preventing, mitigating or compensating this impact are indicated.

11.5. Noise emission

To decrease the noise level acoustic screens are planned on the section of Młynki.

The screens will be covering the noise source, i.e. the road, for the sound wave not to travel directly into the building. The screen should be at the same time considered as an element of space development influencing e.g. its perception by users. Details of screen parameters impacting their efficiency, such as:

- Place of erection (location),
- Geometrical parameters (height, length),
- Material

should be specified at the stage of the construction design. The design should include the following aspects:

- Efficiency of a screen increases as it approaches the noise source and as its height increases,
- Despite high theoretical efficiency an insufficiently high screen may be ineffective as it may not cover the sections of the noise source significant for the receiver,
- Possible field of reflected waves should be included in the design,
- Acoustic insulation of the screen (the degree of penetration of its structure by sound) should be no less than 20 dB, in general. Such insulation is ensured by special, attested structures of materials and panels for the construction of screens.

The conducted calculations of forecast distribution of noise emission showed that the permissible noise level, mostly at night, may be exceeded for a few residential buildings, requiring appropriate protective measures. **Acoustic screens may be pre-indicated as an effective measure that can be used in the condition of the project.** They will be covering the noise source, i.e. the road, for the sound wave not to travel directly into the building.

The screens have been calculated for night-time with forecast traffic intensity for 2025. It was assumed that the screen would be located up to 5.75 m from the edge of the road (edge of the lane). According to the calculations, the screens should be 200-300 m in length and 5-6 m in height or 300-400 m in length and 4-5 m in height. Such screens allow for full protection of the adjacent buildings. The suggested screens increase the impact of the planned ring road from 190 m to 5.75 m from the edge of the road (edge of the lane).

Table 5. Suggested locations of acoustic screens for Variant A

| No. | Starting point of the screen | End point of the screen | [m] | Side of the road |
|-----|------------------------------|-------------------------|-----|------------------|
| 1. | 17+275 | 17+575 | 300 | north |
| 2. | 17+275 | 17+575 | 300 | south |

The 50 dB(A) equal-loudness contour range for night-time in 2025 on the interchange section will be reduced to 184.35 m

Table 6. Suggested locations of acoustic screens for Variant B

| No. | Starting point of the | End point of the | [m] | Side of the |
|-----|-----------------------|------------------|-----|-------------|
| 1. | 17+170 | 17+470 | 300 | north |
| 2. | 17+200 | 17+600 | 400 | south |

The 50 dB(A) equal-loudness contour range for night-time in 2025 on the interchange section will be reduced to 184.35 m

12. Specification of assumptions for necessary studies of identified monuments in the area of the planned undertaking discovered during the construction works

From the position of the historic monument conservation officer, it is necessary to perform the following archaeological studies:

1. surface review of AZP (Archaeological Image of Poland) studies along the investment route (in early spring) to precisely specify the location of stands with regard to the network course.
2. pre-investment excavation rescue studies on stands located within the belt occupied by the investment
3. introduction of archaeological supervision for all earthworks performed within the investment, such as:
 - earthworks related with the roadway construction, especially dehumusing on the route of the ring road,
 - earthworks in the reconstruction of the necessary technical infrastructure (water, gas, electricity supply networks – low-voltage and telecommunication networks)
 - earthworks related with the construction of auxiliary engineering facilities (flyover, bridge etc.)
4. in the case that cultural stratifications, archaeological objects, building development relics and movable historical objects are found within the area included in the investment project, all works must be stopped in order to carry out rescue archaeological investigations consisting in the documentation of discoveries and complete exploration of the objects.

According to Art. 36, section 1, item 5 of the Act on Historic Monument Protection and Custody, the performance of archaeological investigations requires a permit from the Lubuskie Voivodeship Historic Monument Conservation Officer in Lublin.

13. Limited use area

For the planned **undertaking a limited use area is not necessary** due to the following:

- As indicated by the calculations, the acoustic screens in Młynki may effectively eliminate the observed exceeded permissible noise levels.
- Negative impact on the contamination of air falls within the borderlines of the planned roadway.

14. Suggested monitoring

In accordance with the Ordinance of the Minister of the Environment of 2 October 2007 on requirements for conducting measurements of the levels of substances or energy in the environment by the road, railway, tramway line, airport or port authority (Journal of Laws No. 192, Item 1392), the Administrator of the road shall perform periodical measurements of substance levels in the environment. The measurements will allow the actual impact related with the operation of the road to be determined and measures to minimise unfavourable impact to be undertaken, if necessary. The ordinance specifies the reference methodologies of performing periodical measurements and general rules of measurement point location.

15. Suggested scope of post-implementation analysis

The noise impact analysis shows that permissible noise levels may be exceeded for more than a dozen buildings. Thus, the report suggests a method of decreasing the noise level by building acoustic screens. Due to the fact that these are theoretical calculations based on a mathematical model and a theoretical traffic forecast, it is suggested to perform a post-implementation analysis. The analysis should be carried out after 1 year of the facility commissioning date and submitted within 18 months of the facility commissioning date.

The post-implementation analysis should only evaluate the noise level. The analysis should be based on field tests (measurements).

16. Final conclusions

Considering the activities minimising the environmental impact of the undertaking planned in the report and specified in items 11.1 and 11.2 of this summary and the designed:

- acoustic screens,
- crossings for wild animals with proper development of access paths, fencing of the roadway
- use of grass ditches, sectional rainwater sewage system with pre-treatment devices,

it can be concluded that the construction of Stage II of the Puławy ring road in the line of national road no. 12 will not have a significant impact on the natural environment.

The environmental impact in both variants (A and B) is similar. Due to a less significant nuisance for the residents of Młynki, Variant B bypassing this town (it does not *divide* the developments of the town) is more favourable. The acoustic screens will allow decreasing the noise to the permissible level. The location of the ring road collides with the Puławy Natura 2000 area only slightly and does not defragment or disrupt the integrity of the network.

The construction of the ring road is expected by the local community to be a way of improving living conditions and ensuring proper environmental policy.

17. Explanation of abbreviations and expressions

- ADT, average daily traffic in a year (V/24h), (Polish: SDR),
- DK 12, national road no. 12,
- DW voivodeship Road
- DP powiat Road
- DG commune Road
- S12 , expressway no. 12,
- LSDP, local spatial development plan (Polish: MPZP),
- PSP, passenger service point (Polish: MOP),
- MGWR, Main Groundwater Reservoir (Polish: GZWP),
- PC, programme concept (Polish: KP),
- KPO, end point of the planned ring road,
- PPO, starting point of the planned ring road,
- BGL, below ground level,
- SBPA, special NATURA 2000 bird protection area (Polish: OSO),
- SPA, special NATURA 2000 habitat protection area (Polish: SOO),
- PLA, Protected Landscape Area (Polish: OChK)

18. Appendices

1. Initial variants of the S12 expressway
Scale: 1:25,000.
2. Location of the planned variants of the Puławy ring road.
Scale 1:25,000.
3. Noise maps:
 - variant 0 – equal-loudness contours for night-time, 2025.
Scale 1:10,000.
 - Variant A – without the location of acoustic measures
Scale 1:10,000.
 - Variant A – with the location of acoustic measures
Scale 1:10,000.
 - Variant A – without the location of acoustic measures
Scale 1:10,000.
 - Variant A – with the location of acoustic measures
Scale 1:10,000.
4. The existing transport system with regard to protected areas, contaminated range