

Environmental impact report on the designed construction investment of wind farm complex and GPZ transformer station with auxiliary infrastructure within the grounds of Lędzin, Gocławice, Kusiń, Drozdowo - Karnice commune.

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Annexes:

- List of photographs,

- The decision of Karnice Commune Head, sign: BGK – 7624/2006 dated 26 January 2006, imposing the obligation to prepare the report and its scope,
- Copy of cadastral map with marked boundary lines,
- Appendix No 1 – Dariusz Janicki, Robert Kościów 2006. Environmental impact assessment of “Karnice” Wind Farm Complex as regards environment protection. Typescript,
- Appendix No 2 – Tomasz Andrzejewski 2006. Impact assessment of noise emitted to environment from designed Wind Farm Complex -“Karnice”. Typescript,
- Appendix No 3 – Stanisław W. Wierzbicki 2006. Influence of electromagnetic field and noise on construction environment of Skrobotowo end user transformer substation 20/110 kV for the purpose of Karnice wind farm complex. Typescript,
- Appendix No 4 – Krzysztof Szyłański, Michał Szyłański, Grażyna Szyłańska 2006. Geological opinion for the purpose of Environmental impact report on the planned investment. “Karnice” Wind Farm Complex. Skrobotowo, Karnice commune, gryficki powiat. Typescript.

1. Introduction

The subject matter of this analysis is an environmental impact report on designed venture of wind farm construction (FW) consisting of 13 power stations of power rating 2,3 MW each, and of end-user transformer substation (GPZ). Planned investment is located round localities: Lędzin, Gocławice, Kusin, Drozdowo in Karnice commune.

The report was prepared on the grounds of partial analyses of selected issues and the analysis of their impact on environment.

This analysis includes conclusions drawn from partial analyses determining the possible influence of the designed investment on selected elements of environment during the construction, operation and liquidation phase.

Detailed information together with the analysis of the venture's impact on particular elements of environment is contained in detailed analyses attached to the report as appendices.

- Appendix No 1 – Dariusz Janicki, Robert Kościów 2006. Environmental impact assessment of “Karnice” Wind Farm Complex as regards environment protection. Typescript,
- Appendix No 2 – Tomasz Andrzejewski 2006. Impact assessment of noise emission from “Karnice” Wind Farm Complex. Typescript,
- Appendix No 3 – Stanisław W. Wierzbicki 2006. Influence of electromagnetic field and noise on construction environment of Skrobotowo end user transformer substation 20/110 kV for the purpose of Karnice wind farm complex. Typescript,
- Appendix No 4 – Krzysztof Szyłański, Michał Szyłański, Grażyna Szyłańska 2006. Geological opinion for the purpose of Environmental impact report on the planned investment. “Karnice” Wind Farm Complex. Skrobotowo, Karnice commune, gryficki powiat. Typescript.

2. Legal basis

When preparing the analysis the following legal acts were referred to:

- a) Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) (Journal of Laws of 1996 No. 58, item 263, 264),
- b) Convention on protection of migratory species of wild animals (Bonn Convention),
- c) Announcement of the Speaker of the Sejm of the Republic of Poland dated 4 July 2006 on promulgation of consolidated text – Environmental Protection Law (Journal of Laws of 2006 No. 129, item 902),
- d) Regulation 4/2005 of the Voivode of Zachodniopomorskie dated 22 March 2005, on landscape protection area (Zachodniopomorskie voivodship's Official Journal of Laws No. 25, item 497 of 2005),
- e) Regulation of the Minister of the Environment dated 27 September 2001 on waste catalogue (Journal of Laws No. 112, item 1206),
- f) Regulation of the Minister of the Environment dated 6 June 2002 on permissible level of certain substances in air, alarm levels of certain substances in air and a margin of tolerance for permissible levels of substances (Journal of Laws No. 87, item 796),
- g) Regulation of the Minister of the Environment dated 5 December 2002 on basic size for certain substances in air (Journal Of Laws No. 1, item 12),
- h) Regulation of the Minister of the Environment dated 30 October 2003 on permissible levels of E-M and ways of keeping the levels (Journal of Laws No. 192, item 1883),
- i) Regulation of the Minister of the Environment dated 29 July 2004 on permissible noise levels in environment (Journals of Laws No. 178, item 1841),
- j) Regulation of the Minister of the Environment dated 9 July 2004 on protected species of fungi growing wild (Journal of Laws Nr. 168, item 1765),
- k) Regulation of the Minister of the Environment dated 21 July 2004 on special bird protection areas Natura 2000 (Journal of Laws No. 229, item 2313),
- l) Regulation of the Minister of the Environment dated 28 September 2004 on protected wildlife animals (Journal of Laws No. 220, item 237),

- m) Regulation of the Council of Ministers dated 9 November 2004 on type determination, Regulation of the Minister of Environment dated 9 July 2004 on protected species of plants growing wild (Journal of Laws No. 168, item 1764),
- n) Regulation of the Council of Ministers dated 9 November 2004 on determining types of ventures which could have a significant impact on environment and on detailed conditions connected with classifying ventures to prepare the environmental impact report (Journal of Laws No. 257, item 2573 as amended),
- o) Regulation of the Council of Ministers dated 11 March 2005 on determining the list of game species (Journal of Laws No. 45, item 433),
- p) Regulation of the Council of Ministers dated 10 May 2005 amending the regulation on determining types of ventures which could have a significant impact on environment and on detailed conditions connected with classifying ventures to prepare the environmental impact report (Journal of Laws No. 92, item 769),
- q) Regulation of the Council of Ministers dated 16 May 2005 on types of habitats and plant and animal species in need of protection in the form of determining the areas Natura 2000 (Journal of Laws No. 94, item 795),
- r) Resolution No. XIX/127/2004 of the Council of the Commune in Karnice dated 28 August 2004 on local zoning plan for the location of wind farm within the grounds of Lędzin, Gocławice, Kusin, Drozdowo, Karnice commune (Zachodniopomorskie voivodship's Official Journal of Laws No. 79, item 1356),
- s) Act on forests dated 28 September 1991 (Journal of Laws No. 56, item 679 as amended),
- t) Act on zoning plan dated 7 July 1994 (Journal of Laws No. 15, item 139 as amended),
- u) Act on agricultural land and forest protection dated 3 February 1995 (Journal of Laws of 1995 No. 16, item 78),
- v) Act on ratification of Biodiversity Convention dated 31 August 2001 (Journal of Laws of 1995 No. 58, item 565),

- w) Acts dated 27 April 2001 – Environmental Protection Law (Journal of Laws No. 62, item 627 as amended),
- x) Act on waste dated 27 April 2001 (Journal of Laws No. 62, item 628 as amended),
- y) Act on preservation of the national character of the country's strategic natural resources dated 6 July 2001 (Journal of Laws No. 97, item 1051),
- z) Act on nature preservation dated 16 April 2004 (Journal of Laws No. 92, item 880 as amended),
- aa) Regulation of the Minister of Mining and Power Industry dated 28 January 1985 on detailed directives of design and operation of electro-energetic devices as regards people's and environment protection from E-M field's influence (MP No. 3, item 24 of 1985).

3. Scope and purpose of the analysis

The scope of the report is defined pursuant to:

- Article 52 of an Act dated 27 April 2001 – Environmental Protection Law (Journal of Laws No. 62, item 627 as amended),
- Resolution No. XIX/127/2004 of the Commune Council in Karnice dated 28 August 2004,
- Decision of Karnice Commune Head, BGK – 7624/2006 dated 26 January 2006.

The report includes biotic and abiotic natural environment of the area of the designed investment and adjacent areas.

The aim of this analysis is to determine the environmental impact of the investment as regards:

- Impact on biotic environment: people, flora, fauna,
- Impact on natural and cultural landscape,
- Impact on soil,

- Impact on air,
- Impact of the investment in question on acoustic climate of the surroundings,
- Impact of the designed investment on the level of electromagnetic field of the surroundings,

4. Description of the planned venture

4.1 Description of the venture and conditions of site utilisation in implementation and operation phase.

Location of the wind farm (FW) is planned within the area of the investment. The wind farm will consist of the complex of 13 wind farms Siemens Mk II 2.3 MW type and end-user transformer substation (GPZ). The structures of the wind farm will be located on the area between localities: Lędzin, Gocławice, Kusin, Drozdowo in Karnice commune. Designed transformer substation (GPZ) will be situated next to Drozdowo village. Apart from location of wind farm towers and transformer substation, auxiliary infrastructure will be created: underground power cables, optical fibre connection network, access roads and assembly sites.

Apart from location of wind farms, access roads and assembly sites, the area is to be used for agriculture.

The designed investment is included among investments which could have a significant impact on environment.

In order to decrease the environmental impact of the designed wind farm (FW), wind farms Siemens MK II 2.3 MW (SWT-2.3-93) type and end-user transformer substation GPZ 20/110 kV in 4H system were chosen for the realisation of the investment. Wind farms which are planned to be used are one of the most modern devices of this type, adapted to work in wind conditions found at the investment's location. They have technical solutions which allow for regulation of the acoustic power and consequently they decrease the level of emitted noise. They are equipped with modern electronic systems monitoring wind farm operation, and in case of strong wind, they shut it off preventing break-down. Siemens Company, one of the leading producers of modern technical solutions in power sector, is the producer of the devices.

Parameters of Siemens Mk II 2.3 MW (STW-2.3-93) wind farm:

- Height of the tower – 98m,
- Total height of wind farm – 145m,
- Type of the tower – cylindrical,
- Colour of the surface – bright grey, RAL 7035,
- Corrosion protection – painting,
- Rotor type – 3-lobe,
- Position – against the wind,
- Rotor diameter – 93 m,
- Rotor operation field – 6800 m²,
- Rotational speed – 6 – 16 rpm,
- Length of rotor blade – 45 m,
- Colour of surface painting – bright grey, RAL 7035,
- Power rating – 2300 kW,
- Voltage – 690 V,
- Frequency – 50 HZ,
- Acoustic power LLAW = 107,1 dB,
- Wind velocity for start-up – 4 m/s,
- Wind velocity for power rating – 13-14 m/s
- Wind velocity for automatic shut-up – 25 m/s,
- Rotor weight – 60 t,
- Tower weight – ca. 162 t.

Parameters of end-user transformer substation GPZ 20/110 kV in 4H system:

- Power transformer 25 MVA,
- Aerial switching station 110 kV,
- Switchroom 20 kV with control station.

Site utilisation in the realisation and operation phase is determined by Resolution No. XIX/127/2004 of the Council of the Karnice Commune dated 28 August 2004 on local zoning plan for the location of wind farm round Lędzin, Gocławice, Kusin, Drozdowo, Karnice commune.

Total surface of the area covered by this analysis is 225,964 ha, out of which:

- 88,80 ha – allocated for location of wind farms, temporary roads and assembly sites and access roads for maintenance purpose during operation,
- 0,8 ha – as an area for electrical equipment, location of substation – main feeding point (GPZ),
- 136,35 ha – allocated for agricultural cultivation.

4.2 Characteristics of the production process

As a result of the production process wind farms convert kinetic energy of wind into electric energy. Produced electric energy will be transmitted through underground cable lines of 20 kV voltage to end-user transformer substation (GPZ) 20/110 kV, and further transmitted to the existing electric power system of the overhead line 110 kV Niechorze – Trzebiatów. Lighting and heating within the area of end-user substation will be provided by electric energy from a transformer for own purpose 20/0,4 kV, powered from switching station 20 kV.

Both wind farms and end-user substation (GPZ) are maintenance-free devices. Therefore, sanitary appliances, rest and refreshment rooms are not planned to be made.

In order to monitor correct operation, wind farms and the substation (GPZ) will be connected by systems of optical fibre leads arranged along underground cable lines.

For periodic maintenance of devices, temporary access roads to wind farms and GPZ substation will be created.

Access roads and assembly sites will be prepared using ground supplied from foundation trenches of wind farm and aggregate. Wind farms will be constructed on assembly sites from ready-made elements put together into whole. Wind farms will be fixed in the ground on reinforced concrete foundations.

4.3 Expected emission resulting from operation of the planned venture.

Wind farms belong to a group of sources of the so-called environment friendly energy, also called “green energy”, produced from renewable energy sources – wind. Thanks to conversion of kinetic energy of wind into electric energy, wind power plants contribute to the decrease of emission of deleterious substances (SO_x, NO_x, CO_x) and dust produced in conventional power plants. Decrease of CO₂ emission to atmosphere contributes to stopping global warming which could have disastrous ecological consequences. The impact described above is beneficial for natural environment preservation, helps to keep the animal reproduction sites unchanged and has a positive effect on the quality of environment and consequently on people’s health (see Chapter 10.2).

Wind farms are maintenance-free devices. They do not require setting up an additional sanitary, water and sewer system appliances, or rest and refreshment room for employees. As a result, waste products are not produced and there is no need to lay water and sewage system.

Slight amount of waste is produced as a result of maintenance work as regards wind farms and GPZ substation. It will be collected by maintenance service and disposed of in a specified landfill site (see Chapter 10.2).

During operation of the venture the following emissions will be generated:

- Acoustic energy produced by running rotor blades (see Chapter 10.2),
- Electromagnetic fields of cable lines and GPZ substation (see Chapter 10.2).

Emissions have a potential impact on biotic elements of the environment: flora, fauna and human beings (see Chapter 10.2).

5. Description of analysed variants of the venture

5.1 No-go decision variant

Abandoning the realisation of the investment will not have a direct impact on natural environment of the area in question, it will remain unchanged. Not continuing the venture will mean resignation from economically advantageous supply of renewable energy. Positive impact of wind farms, its contribution to decreasing the emission of pollution to atmosphere including greenhouse gas CO₂, will not take place. Abandoning the construction of the designed wind farm FW is contradictory to global policy envisaging the limitation of air pollution and greenhouse effect.

5.2 Environmentally most advantageous variant

During the design of wind farms towers location, recommendations included in the previously made analyses were taken into consideration, that is: ecophysiography and environmental impact prognosis. The recommendations aimed at limiting the possible negative impact of the investment on natural environment. As a result of the analysis of environmental considerations, investment location variant minimising environmental impact was prepared. Selected variant ensures the construction of wind farms and GPZ substation according to the most recent technological solutions. In comparison with older types of wind turbines available on the market, modern wind turbines have technical solutions which decrease the level of noise emission to surroundings. Special structure decreases vibrations transmitted to the ground.

Produced energy is rated among environment friendly, the so-called “green energy” and is consistent with global tendency envisaging limitation of harmful substances emission to atmosphere.

Poland as one of the parties of the United Nations Framework Convention on Climate Change, is obliged to reduce emission of greenhouse gas and other gas resulting from combustion of coal in particular. Since 19th century till now the average temperature on earth

increased by 0,7°C, while exceeding the limit by 2°C can cause Greenland glaciers to melt. It is believed that the main cause of the changes is greenhouse gas, carbon dioxide in particular. According to WWF as much as 37% of emission of this gas comes from producing energy from mineral fuel.

International Energy Agency estimates that electric energy consumption in the world will double till 2020. It is estimated that 20% of electric energy global-wide will be produced from renewable energy sources. Upon joining the European Union, Poland is obliged to produce 7,5% of electric energy from renewable energy sources in 2010. In Poland, including the territory of zachodniopomorskie voivodeship, gradual increase in the number of both single power plants as well as complexes of wind farms can be observed, yet this tendency is not widespread.

Energy obtained from wind farms is called an environment friendly form of energy. 1 kWh of electric energy produced during operation of a wind farm allows for substitution of 1 kWh of energy produced by a power plant producing energy from coal. Thus, emission of pollution connected with this process is eliminated.

It can be assumed that annual emission of compounds to atmosphere with the production of 1 MWh of electric energy in conventional power plants is:

- 7,8 kg SO₂;
- 3,2 kg NO₂;
- 937 kg CO₂;
- 0,2 kg CO;
- 1,1 kg of dust.

The planned investment envisages the operation of 13 wind farms of 2,3 MW power each, which gives 29,9 MW of power rating. Production of electric energy by Karnice Wind Farm will allow for annual decrease of coal combustion by ca. 95 000 tons in conventional power plants. The above-mentioned data prove that substitution of energy from coal with energy from renewable energy sources can bring large benefits.

The results of acoustic climate and GPZ electromagnetic fields analyses for this variant do not indicate that the limits were exceeded in the vicinity of dwellings. Both wind farms and GPZ substation will operate as maintenance-free, human manipulation will be limited to periodic survey and possible repair only. Both structures will not emit pollution to atmosphere, GPZ substation is secured with special oil sump which will take the whole oil volume in case of break down.

Selected variant of the venture is located in the surroundings at its optimum. It is situated on agricultural cultivation grounds of low environmental value. Results of pre-investment monitoring indicate the lack of bird attraction effect (see Chapter 7.3, appendix 1). Selected variant of the location of the investment does not enter into legally protected areas in the neighbourhood. Through construction of wind farm within environmentally valuable areas and a negative impact on environmental resources of these objects, other variant of the location would cause interference with national and regional system of environment protection.

Selected variant of the investment meets the guidelines of preservation of environmentally valuable objects located in the vicinity of the investment area, including the area of Natura 2000. In the selected variant, towers of wind farm are located at least 100 m away from the boundary of important natural areas (legally protected, proposed for protection) adjacent to the area covered by this analysis. Within the area of the investment, pre-investment monitoring showed none of the habitats or animal species for which the Special Area of Habitat Preservation “Trzebaitowsko-Kołobrzesci Pas Nadmorski” was created (see Chapter 7.3, appendix 1). Within the area of the investment, pre-investment monitoring showed none of the species included in Appendix I of the Birds Directive, for which the Special Area of Bird Preservation “Ostoja Trzebiatowska” was designed to be created (see Chapter 7.3, appendix 1). Selected variant borders on Natura 2000 areas on a short section, yet it does not cross the boundary in any point (see map 2, appendix 1). Selected variant of the investment is the most optimum variant and it will not influence the integrity of Natura 2000 areas in negative, direct or indirect way.

Selected location is beyond existing areas legally protected or planned to be protected. It is situated outside bird migratory routes (see Chapter 7.3, appendix 1). It does not constitute an ecological barrier on any of the area's sections since there are open spaces (from 350 to 800

m) in between the wind farm towers. Moreover, wind farm towers are lined in a row, erected parallel to bird migratory routes indicated in pre-investment monitoring (see Chapter 7.3, appendix 1). Such positioning of wind turbines creates areas of possible migratory air routes for animals.

Aforementioned data permits to claim that the variant selected for realisation of the investment is the most beneficial for the environment.

6. Description of environment components included in the scope of the expected impact of the planned venture.

6.1. Location of the venture area

The area of planned wind farm is situated on a moraine elevation but its exposure and height domination depends on the direction the observer is looking in. It is the most exposed compared with areas situated on the north and west side. Areas that surround the wind farm area from the north-west are the remains of Pomeranian proglacial valley now replaced by the watercourse of Kanał Łądkowski. Height difference within this area amounts to 2.4 m to 0.5 m above sea level in the vicinity of the village of Śliwin. The exposure is less significant within other areas adjacent to the wind farm area. Here, the height difference amounts to 15 m above sea level near the village of Gocławice to 21.5 m above sea level near the village of Kusin. At the same time, as far as the landscape is concerned, the area of wind farm is isolated from the north-east and south by forest complex and tree and bush complexes along Liwka watercourse. Such landscape physiognomy masks the elevation of wind farm area in the landscape.

The area of planned GPZ station is not distinctive in special landscape, it is rather similar to the surrounding one. At southern and western border there is a complex of trees and bushes partly dividing this area from the landscape of adjacent areas.

6.2. Abiotic elements

6.2.1. Geomorphology

From the geological structure point of view, the district of Karnice is situated within the area of slight Caledonian orogeny – within the Pomeranian anticlinorium. Its present shape was created as a result of north-Polish glaciation activity, i.e. the last of three glaciations that took place within the area of present Poland.

It is an open, fairly flat area with few elevations. In its middle part it is crooked by a irrigation channel stretching from the north to the south. The area of investment is almost devoid of complexes of bushes and trees. From the south and east until the border of the area of investment there are small forested areas. It is a part of slightly undulating ground moraine plateau. The height difference amounts to c.a. 12 m to c.a. 8,9 m above sea level in the valley of drainage ditch to 21.6 m above sea level near Skrobotowo village. The top layer consists of plant soil, under which there is a geotechnical layer in the form of plastic sandy soils whose adaptability level equals $I_L = 0,374$.

The area under analysis belongs in particular to agricultural areas with predominant cereal monoculture. It is situated on ground moraine plateau built of morainic clays (read appendix 4).

6.2.2. Soils.

The soils of the District of Karnice are built of geological deposits such as morainic clays, outwash deposits and river sands of accumulation terraces. These are mainly leached soils created from light and medium morainic clays. They are the most useful in agriculture and usually belong to III class in quality classification.

Within the area of study there was a change of the purpose of agricultural land which was not a dense complex of farmlands of mineral origin for non-agricultural purposes for foundations, GPZ stations, exploitation roads and assembly yards of total area equal to 7.0363 ha including:

- 2.2434 ha of R III class farmlands,
- 4.0727 ha of R IV class farmlands,
- 0.1154 ha of PS IV class farmlands,
- 0.4738 ha of L V class farmlands,
- 0.131 ha of L VI class farmlands.

6.2.3. Hydrology.

Within the area of study there are no water tanks and large watercourses. The nearest tank is c.a. 4 km away from the northern border of the area of investment. It is "Liwia Łuża" nature reservation (map 2). A drainage ditch leads through the centre of the area and flows into the watercourse of Liwka. The watercourse of Liwka flows into Kanał Łądkowski (Appendix no. 1, map 2). Liwka, as well as Kanał Łądkowski are not connected with the borders of the area of evaluation, but they are situated within the distance of 100 m to 2 km.

In the area of study, in ground surface ground water existence was detected in the form of seepings on the depth of 2,1 to 3,6 m ppt (read Appendix 4).

6.2.4. Landscape.

Natural landscape.

The area of location of the wind farm from the north borders on a district road from Skrobotowo through Kusice to Chomętów. It is a road with a small amount of standalone trees and bushes. The area to the north of the road consists of farmlands.

From the south it partly borders on forested areas along a unnamed watercourse, and partly with farmlands. Along the unnamed watercourse there are alder woods and bushes of hawthorn and bluethorn. The afore mentioned watercourse flows along and into Kanał Łądkowski.

The western order is a district road from Karnice to Lędzin. The eastern border is marked by a forested complex between the villages of Gocławice and Czaplice. The area of designed location of GPZ transformation station is located on farmlands near the village of Kusin.

Antropogenic landscape

In the district of Karnice there are no industrial plants which exert considerable influence on the environment. In the area of study and adjacent areas there are no industrial plants. The planned investment is located within agricultural landscape. Almost the whole

area of wind power plants is covered by farmlands. In agricultural culture farmlands are predominant and meadows cover insignificant area (the area of GPZ station).

The main elements of anthropisation of the wind power plants and GPZ station location area are:

- villages situated around the area of study: Skrobotowo, Kusin, Drozdowo, Czaplice, Gocławice, Karnice,
- the system of district and field roads that connect respective villages and create the access to fields,
- energetic lines of high and low voltage,
- radio and television towers and mobile phone networks,
- drainage ditches.

Villages around the area of investment are formed as so called linear villages in which houses are situated along a road.

An energetic line of medium voltage goes through the area of wind power plants location from the village of Kusin towards Gocławice further to Karnice.

Along the northern border of the area of study goes a line of high voltage of 110 kV from Niechorze to Trzebiatów.

Within 200 m from the northern border of the area of investment there is a tubular RTV mast near the village of Kusin. Further north there is a tower of mobile telephony.

A drainage ditch runs through the central part of the area under study and carries the excess of water from the nearby farmlands to an unnamed watercourse flowing along the southern border which in turn carries the water to Kanał Łądkowski.

Sources of noise.

Human activity causes noise emission to environment. Its main sources are:

- vehicle traffic on local district and field roads,
- energetic high voltage lines (near mass),
- field works with the use of heavy agricultural equipment (up to 80 dB).

Electromagnetic fields.

Principal sources of electromagnetic fields emission within the area of investment and the nearest vicinity are energetic lines of medium and high voltage. A line of medium voltage runs a through the area of study from the village of Drozdówko, Drozdowo, through Kusin to Goławice and further to Karnice. The effect of electromagnetic field of this line is limited to its closest surrounding.

6.2.5. Climate.

Koźmiński (1983) qualified the area of this district to II climatic region, i.e. to Pobrzeże Dziwnowsko-Kołobrzeshire (the Coast of Dziwnów and Kołobrzeg) which stretches through a dozen or so kilometres along the coast of Baltic and has a sea character.

Basic climatic data for this region are as follows:

- average annual temperature: 7,5 - 8,0°C,
- average temperature of vegetation period: 13,0 - 13,3 °C,
- length of vegetation period: 215 - 217 days,
- total annual atmospheric precipitation : 540-650 mm,
- total atmospheric precipitation of vegetation period: 350 - 450 mm.

A feature of this climate is also a lot of days with strong winds, annual average around 50 days, and 35-40 sunny days per a year. In this area winds are mainly from the south and west. The number of hot days is fairly small, only 15. The number of frosty days is 36-43, an in mild winters the number drops even to 5. Here the winter starts the most late as well, on

average after 15 January and ends the earliest in the sea area (read Chapter 7, Appendix No. 1).

6.3. Biotic elements.

6.3.1. Flora.

The flora of the area under study involves popular species which are cosmopolitan and widely spread throughout the region and in Western Pomerania. The flora of the area of investment is connected mainly with human activity, with agriculture and woodlots. The whole area of investment is situated within agricultural areas of cereal cultivation, in particular winter crops. A small area of land covers meadows (the GPZ station area). Natural flora concentrates in little forested complexes by southern and eastern border of the area of planned investment.

In the area of wind turbines location small isolated clumps of trees and bushes are visible in the middle of fields. a detailed analysis of flora is presented in Appendix No. 1.

In the middle part of the area there are single trees (mainly birch) and bushes growing along the drainage ditch. The investment will have no influence on this community due to the foundation of the towers within 100 m.

In the area of foundation of wind power plants towers no species of legally protected or endangered plants were detected (read Chapter 7.4, Appendix. 1).

In the area of designed investment there was no detection of plant species or habitats for which SOO Natura 2000 – PLB 320017 located in the north was founded (read Chapter 7.4, Appendix 1).

6.3.2. Fauna.

In the area of planned investment, the foundations of wind power plants, common animal species were detected. The fauna of this area was connected mainly with agriculture, preferring open areas or woodlots. A detailed analysis of the fauna is presented in Appendix No. 1. In order to collect data for analysis of vertebrate species, birds in particular. In the area of investment a yearly ornithological monitoring was carried out. Observations took place from Spring until Winter 2006, in accordance with methodology of Kościów (2006). A detailed characteristics of used methods of study is presented in Chapter 2 of Appendix No.1.

On order of the investor, monitoring is still in progress in order to collect a large amount of data.

During field works, within ornithological monitoring, the presence of 118 bird species was discovered, in particular in the areas adjacent and neighbouring to the area of investment. The area of investment is characterised by little diversity of birds. In the process of field observations 12 species were confirmed, of which one was breeding skylark (*Alauda arvensis*); five of them stayed in the area of investment: common buzzard (*Buteo buteo*), rook (*Corvus frugitegus*), hooked crow (*Corvus corone cornix*), raven (*corvus corax*), starling (*Turnus vulgaris*), the rest were migratory species: mute swan (*Cygnus olor*), crane (*Grus grus*), lapwing (*Vanellus vanellus*), black-headed gull (*Larus ridibundus*), wood pigeon (*Columba palumbus*), Eurasian collared dove (*Streptopelia ecaocto*). In the process of ornithological monitoring mainly very common species connected with agriculture were detected (see Table 2, Appendix 1). Around the area of investment nests of white stork were found in villages of Kusin, Czaplice and Cerkwica (read chapter 7.3., Appendix 1).

In order to determine the extent of the investment influence on birds, in the process of ornithological monitoring the following were determined:

1. routes of migratory birds (including directions and heights, seasonal character, local and regional scheme of migrations),
2. feeding grounds and places of rest of the migrants,
3. evaluation of the influence of designer investment, in particular on migratory birds that migrate along their migratory routes in Autumn and Spring, during the day and night.

The results of observations in the process of monitoring proved that the main migratory route in the area of investment runs to the north along the Pomeranian proglacial valley, in the basin of Kanał Łądkowski along the coast of the Baltic. This route was followed by the majority of migratory birds (77,9%), in particular of waterfowl order (e.g. bean goose and white-fronted goose) as well as of passerine order (lapwings and European golden plover) (read Chapter 7.3, appendix 1).

At the southern border of the area under study little intensity of migration (16.3%) was observed. This route was followed particularly by passerine birds (read Chapter 7.3. appendix 1). Passages of passerine birds took place were characterised by low ceiling over

woodlots, and higher above open spaces of meadows and fields – c.a. 14 m above the ground (see Figure 2, Appendix 1).

Observed were significant differences in passage ceilings of various species caused by diversity of systematic groups of birds and their manner of migration and praying during migration.

In the area of designed wind farm, no routes of birds migration were observed, however, praying of migratory birds of passerine order was proved. Only 5.8% of detected flocks of birds flew above the area of designed wind farm. The majority of them were habitat passages and their ceiling was low or very low. In particular, they concerned small passerine birds and single passages of larger birds species, such as ravens *Corvus corax* and buzzards *B. buteo*.

The ornithological monitoring in the area under study showed three routes of bird migration: Baltic – marine, land Baltic – along the coast, midland – of wide front (see Figure 6, Appendix 1).

Baltic route – marine route along the coastal area of Baltic Sea party in the area of coast. It is the migration route of water- and marsh birds. The sea route – Baltic route is situated within 6 km from the designed farm of wind power plants which poses no threat to birds migrating along this route.

Baltic-land route leads along the sea coast covering beach belt, coastal dunes and woods. It is the main route of passerine birds migrations which is of international importance. The results of statistical tests points to the fact that the likelihood of passerine birds migration in migration period on low and medium ceiling in the vicinity of farms is statistically significant. On analysis of the data collected during autumn passages (VII-XI) in the area of wind farm it may be stated that a farm constitutes no potential obstacle for birds migrating along the Baltic-land route. The risk of collision of birds with wind power plants is insignificant.

The midland route runs through Pomeranian proglacial valleys and the valley of Świniec. The midland route connects the route of passage running through the valley of Rega and along the valley of Parsęta river. It is also the route of passage between Liwia Łuża and Resko Przymorskie lakes. The width of the route equals to the width of the channel of the proglacial valley (read Chapter 7.3., Appendix 1).

Evaluation of potential influence of designer wind farm on migratory birds.

The presence of units valuable for natural environment does not prevent the realisation of planned investment in the wind farm.

The farm location is safe for long-distance migrants such as geese, starlings or plovers. The designed farm is situated on a position exposed in the open agricultural landscape, thanks to which it will be a complex clearly visible by migrating birds.

Main passage router does not cross the designer wind farm. Passages of birds who prey on fields are safe, as they have low ceilings or along mid-field trees.

The location of wind farm is not a **passage barrier** for long-distance migrants. The presence of open wide spaces among which farmlands are predominant enables potential birds to pass the farm round even from large distances, as it is in case of geese. There are grounds to claim that the complex will not be an obstacle for migratory birds.

Marshy meadows adjacent to the wind farm are not a rest place of bigger bird species, such as storks, cranes and geese. Passages of birds through the proglacial valley, in particular of tiny passerine birds are characterised by wide front low above willow brush and woodlots. The route of geese passage in this area runs above Łądzin and Liwia Łuża lake, and the danger for geese are intensive shooting by hunters.

Apart from birds the monitoring aimed to observe bats and bigger mammals, mainly game due to the proximity of forest complexes. Those were roe deer, boars and often rabbits. Game moved down compact routes among midfield woodlots, along shrub lots by the drainage ditch and forest complexes by southern and western borders of the investment.

As far as bats are concerned, there were particularly common pipistrelles. Rarely were serotine bats observed. The afore mentioned species appear mainly within areas proved existent and designed environmentally valuable areas or in their vicinity. In general, they were observed by southern and eastern border of the study, above marshy meadows, at watercourse and in the vicinity of forest complexes. Scarcely were bats observed within the area of planned foundations of wind power plants. The designed wind power plants are located at least 100 metres from these areas which guarantees no collisions of these mammals with mill towers. Within the area of the investment and in direct vicinity

Within the area of investment and in direct vicinity, there were no bat species referred to in Habitat Directive (read Chapter 7.3., Appendix 1).

As the planned location of wind power plant towers is moved away from the borders of environmentally valuable areas in their vicinity, their influence on routes of passages of birds and bats will be insignificant.

7. Description of the form of environment preservation within direct range and vicinity of the planned venture

A detailed description of forms of environmental protection was presented in Appendix No. 1.

Within the area of investment there were no legally protected units. In the vicinity, there are environmentally valuable areas existing and designed for protection.

Within c.a. 3,8 km from the wind farm and c.a. 2,5 km from GPZ there is Liwia Łuza nature reserve the area of which amounts to 220 ha. It is a fauna reserve which constitutes Liwia Łuza lake near the sea with and adjacent belt of reeds and rushes. It is the place of hutching of mute swan and many species of water and marsh birds (see map 2, Appendix 1).

Within adjacent areas there is special area of habitat protection (**SOOS) PLH 320017 "Trzebiatowsko-Kołobrzegi Pas Nadmorski"** (Trzebiatów -Kołobrzeg Sea Belt). The majority of the area is situated within 3.6 to 4 km from the wind farm. In this area observed were 17 types of habitat referred to in appendix I of the Habitat Directive. A long list of vascular plant species (over 1000 species) contains a large number of taxons of protected, endangered and rare plants (136 species) including 42 protected species, 3 referred to in the Red Book of Plants of Poland, 57 species endangered in the regions of Pomerania and Greater Poland, as well as 7 animal species referred to in appendix II of the Directive.

Within neighbouring territories there is also an area of particular protection of birds **OSOP PLB 320010 „Ostoja Trzebiatowska"** (Trzebiatów Refugium). The majority of the acreage is situated within 2.4 to 2.5 km from the wind farm (see: map 2, Appendix 1). This area partly coincide with areas of SOOS Natura 2000 "Trzebiatów and Kołobrzeg Sea Belt". Within its whole area a lot of valuable bird species were proved, e.g. mute swan, whooper

swan, bean goose, white-fronted goose, grylag, barnacle goose, Eurasian pigeon, gadwall, dunlin, common snipe, Eurasian woodcock, Eurasian curlew and spotted redshank.

Within nearby areas there are also designed territories which are environmentally valuable (see: map 2, Appendix 1):

- the area of protected landscape (OChK; obszar chronionego krajobrazu) – 1. The purpose of protection is to preserve landscape and geo-morphological of the Pomeranian proglacial valley within the whole route by Karnice commune. OChK – 1 is a habitat of endangered and legally protected plant and animal species,
- ecological site (UE; użytek ekologiczny) – 2 "Łędzińskie Rozlewisko" (Łędzin Pool). The purpose of protection is to preserve the water and marsh area being a reproduction place of valuable animals. It was proved that this area is inhabited by the following species: mute swan, great crested grebe, red-neck grebe, little grebe, grylag, western marsh harrier, little ringer plover, lapwing, wood sandpiper and corncrake.,
- environmentally valuable area (OC; obszar cenny przyrodniczo) – 1. A fragment of the valley of Kanał Łądkowski near the villages of Dreżewo, Ninikowo and Łędzin. This area consists of a complex of damp meadows with midfield wood lots and shrub lots. These areas are partly developed. Observed species: western marsh harrier, corn crane, grasshopper warbler, great grey shrike and white stork,
- OC - 2 environmentally valuable area. Is a gorge on the edge of a moraine through which flows a 1 m wide and 40 cm deep watercourse. It carries pure waters, sandy bottom with a little detritus. The watercourse flows to Kanał Łądkowski. This area is created by meadows which are partly marshy.
- OC – 3 environmentally valuable area. It is an area of improved meadow in which a population of western marsh orchid was proven (*Dactylorhiza majalis*). The population was estimated at around 200 specimens. The OC-3 area partly coincides with the area of designed foundation of the transformer substation (GPZ),
- OC – 4 environmentally valuable area. There are peat bogs at the State Agricultural Enterprise (PGR; Państwowe Gospodarstwo Rolne) Czaplice. It is a marginal lake full of peat, covered with meadows and alder woods. The following species were proven here: western marsh harrier, red kite, crane, pool frog and moor frog,

- OC-17 environmentally valuable area. It is an improved meadow to the north of Cerkwica. Protected plants and animals that appear here are: garden Angelica, European honeysuckle, corn crane, crane, white stork and European tree frog.

8. Description of protected historical monuments in vicinity or within direct range of the planned venture pursuant to regulations of monument protection and care.

Within the area of study there are two zones of archaeological excavation sites and zone of landscape protection entered into the register of the Regional restorer of monuments. There are the following zones of archaeological excavation sites protection (see; map 2, appendix 1):

- W II zone of partial archeological excavation sites protection – no. 21 position 3 (AZP: 17-10/28),
- W III zone of limited archeological excavation sites protection – no. 123 position 3 (AZP: 17-10/28) and no. 124 position 4 (AZP: 17-10/29).

The afore mentioned zones home archaeological monuments of former human activity and early settlement within these territories.

In the vicinity of the area under study, c.a. 2.5 km from the village of Lędzin, there is a Dutch mill, once destroyed and presently restored and inhabited by...

To objects of material culture of this area may belong the character of buildings in the village of Skrobotowo known as linear village, also characteristic of nearby villages of Lędzin, Czaplin Wielki and Gocławice.

9. Analysis and assessment of possible threats and damages to protected historical monuments.

Within the area of study there are archaeological sites (see: map 2, Appendix 1) described in detail in the previous chapter. They are located within a certain distance from places of foundations of electric power plant towers, beyond areas provided for construction of temporary access roads and assembly yards. In case of a decision about the realisation of the investment, there is a requirement of archaeological and restoring supervision, notifying proper monument protection authorities about the intention of undertaking investment activities and possible rescue studies.

10. Environmental impact of the venture

10.1. Impact in construction phase

In the process of planned undertaking, impact on some environmental components will be visible which will concern construction works. The major elements influenced by the stage will be acoustic climate and air pollution. The aforesaid impact will be temporary and will end after the end of this stage. A 10 months' period of construction is forecast.

Impact on soil.

In the process of construction, the impact will be limited to a small area. The aforesaid works will lead to a transfer of the upper layer of soil due to the necessity of temporary roads construction in order to carry building and construction materials, earthworks in order to prepare excavations for foundations of an electric power plant and GPZ station, electric wires, electric power plant assembly with auxiliary infrastructure and place of output storage. The soil obtained in the process of construction works should be stored in such a way that its further use in area zoning is possible after the undertaking is completed. Such soil must be stored in designated places. It will be necessary to provide temporary hardened access roads to assembly yards. Earthworks cause temporary relocation of earth masses created as a result of such works to a designated place of storage for the period of electric power plant exploitation, after which time original situation will be restored.

Impact on underground and surface waters.

On this stage, the impact of works on underground and surface waters will be insignificant. Apart from the drainage ditch, there are no water bodies within the area of study. There may be a slight pollution of underground waters by petroleum substances from construction machines, This hypothetical situation may be eliminated by proper supervision over the work of machines.

Impact on air.

In the course of construction works there will be a periodical rise in air pollution as a result of movement of transport vehicles and assembly works of wind farms and GPZ stations. The transport of construction materials and operation of heavy machinery will cause temporary growth in liquid emission and products of petrol and diesel burning. There will be a limited emission of carbon monoxide, nitrogen oxides, hydrocarbons and sulphur dioxide as a result of work of combustion engines. In case of welding works CO, NO₂ and suspended dust will be emitted.

Furthermore, in construction works there is an emission of C type petrol, falling dust, xylene, toluene. The emission of pollution into the air will be limited to construction places and assembly of electric power plant and GPZ. As the afore said impact will be periodical, one may evaluate whether a planned investment will exert considerable impact on the air.

Impact on people.

With a view to a considerable proximity of areas adjusted to foundations of electric power plant, the construction is not a threat for local citizens. Such difficulties may happen in the course of transport of workers to the area of work, the disposal of output from the excavation site for the foundations of electric power plant and GPZ station, building and construction materials, as well as the assembly itself due to excessive noise.

Impact on flora.

During construction works there will be a negligible, periodical destruction of flora, mainly all agricultural sowing within the area of electric power plant towers foundations. The negative influence on flora will be limited to assembly yards and access roads, and due to their small area (c.a. 7.04 ha) should not destroy biocenosis.

There will also be a periodical exclusion of a part of land from agricultural activity.

The planned investment will not influence in a negative way on precious habitats and species important for the areas of Natura 2000 as their presence within the area of study was not proven.

Impact on fauna.

The main impact on animals including birds and bats will be connected with high level of noise generated by construction machinery. Of lesser important are fumes of a spontaneous transfer of construction equipment. There may be a temporary leaving of areas around yards with foundations of electric power plant towers by birds. The author's observations and data from existing wind farms point to the fact that such influence on birds is temporary and majority of them returns to old territory after the completion of construction and after the noise stops.

Within the area under this analysis no migratory routes of birds and mammals were identified.

Within the area of designed wind farm no species were determined to be a priority for the special area of habitat protection Natura 2000 "Trzebiatów-Kołobrzeg Sea Belt" or the designed area of special bird protection Natura 2000 "Trzebiatów Refugium" (read: chapter 7.3 and 8.5, Appendix 1).

Impact on material properties

On this stage the impact of the investment on material goods will be insignificant. There may be a temporary destruction of existing field roads caused by transport of building and construction materials and people to assemble the electric power plant.

Impact on monuments and cultural landscape.

The impact on buildings and cultural landscape will be insubstantial. Majority of monuments, in particular archaeological ones, are situated in some distance from the area of investment. Stages of archaeological protection are located within the area of investment, but

apart from the designed places of foundations, assembly yards and temporary roads, there are no other monuments.

Impact on landscape.

On this stage the impact of wind power plants will be negligible. The influence of investment on the landscape disharmony will increase with the growth of height of towers during their assembly.

Impact on acoustic climate.

The use of heavy construction machinery for construction and assembly works will cause temporary increase in noise level up to c.a. 80-105 dB(A) for construction machines and c.a. 90-100 dB(A) in case of car transport. the increase in noise level will not take long, only within the period of construction realisation, and will influence the neighbourhood of the area of investment, Acoustic discomfort may be felt periodically by the population of Skrobotowo and other villages in the vicinity of assembly yards. It will be connected with transport and construction machines operation. Construction works conducted during the night should not cause excessive. It may be stated that the movement caused by assembly works will not cause the contravention of level of a given stage of day.

Impact on the level of electromagnetic field (PEM; pole elektromagnetyczne).

With a view of the scope and character of conducted works, it may be stated that in this stage of realisation of the undertaking no electromagnetic fields will appear to exert negative impact on the environment.

Waste management.

In the course of construction of planned wind power plants, GPZ station with auxiliary technical infrastructure, the following groups of construction waste will be created (order of the Minister of Environment of 27 September 2001 on the issue of waste catalogue):

Waste group code	Waste type
17	Waste created in the course of construction, renovations and disassembly of civil structures and road infrastructure (including soil and contaminated areas of land).
17 01	Waste of construction materials and elements, as well as road infrastructure (e.g. concrete, bricks, plates, ceramics)
17 01 01	Waste of concrete and concrete debris of demolitions and renovations
17 01 03	Waste of other ceramic materials and elements of equipment
17 01 07	Mixed waste of concrete, brick debris, ceramic waste material and equipment elements other than referred to in 17 01 06
17 01 82	Other than waste not referred to herein
17 02	Wood, glass and plastic waste
17 02 01	Wood
17 02 03	Plastics
17 03	Asphalt, pitch and pitch products waste
17 03 80	Waste felt
17 04	Metal waste and scrap, as well as metal alloys

17 04 05	Iron and steel
17 04 11	Cables other than referred to in 17 04 10
17 05	Soil and land (including soil and land of contaminated areas and deepening output)
17 05 04	Soil and land including stones other than referred to in 17 05 03
17 06	Isolation and construction material with asbestos
17 06 04	Isolation material other than referred to in 17 06 01 and 17 06 03

The majority of waste referred to in the table above, except waste groups 17 04 11 and 17 06, may be transferred by the investor to third persons or organisational entities which are not entrepreneurs to be used as they wish. In the event of the lack of afore mentioned transfer the economic entity that has obtained a proper decision of the Starost of Gryfice Poviatic must transport them to a legally operating waste stockpile at the cost of the investor.

Soil and land (1 05 04) will be partly used for the foundation of access roads, the excess will be stored in proper places with a view of its use in order to restore the original condition after the investment is completed.

The amount of output will be specified after completing the project of foundations at the stage of obtaining construction permit.

10.2. Impact on operation phase

The impact on surface layer of soil.

Area unused for construction of foundations of power plants, GPZ stations and auxiliary infrastructure (mainly access road, assembly yards, energetic lines) may still be applied in agriculture. At the stage of exploitation no negative impact on the designed investment on soil is foreseen.

The impact on underground and surface waters.

The designed investment will not badly affect ground and water conditions in case of underground waters, as well as surface ones, and it will not introduce any unfavourable changes to them.

The impact on acoustic climate.

The primary source of noise emission in the designed undertaking is the complex of 13 wind power plants. The noise emission at basic value of acoustic power is too high for the proposed location. For this reason, the power plants will have to operate at lower acoustic power. On the grounds of performed analyses it was determined at $L_{AW} = 104$ dB (read Appendix 2).

The prognosed noise levels on outermost constructions equal to:

- Kusiń $L_{Aeq} = 37,3 - 38,5$ dB,
- Gocławice $L_{Aeq} = 39,1 - 39,4$ dB,
- Skrobotowo $L_{Aeq} = 36,9 - 39,7$ dB.

In case of multi-family residential development, the acceptable noise level in the environment on the border of areas occupied by the construction should amount to:

$L_{Aeq} = 50$ dB between 6 a.m. – 22 p.m.,

$L_{Aeq} = 40$ dB between 22 p.m. -6 a.m.

In case of single family residential development, the acceptable noise level in the environment on the border of areas occupied by the construction should amount to:

$L_{Aeq} = 55$ dB between 6 a.m. – 22 p.m.,

$L_{Aeq} = 45$ dB between 22 p.m. -6 a.m.

The performed analyses prove that all constructions of the area of study remain beyond the access of contour lines $L_{Aeq} = 45$ dB (norm for day time) and $L_{Aeq} = 40$ dB (norm for night time). The source of noise will also be GPZ station, its noise emission will remain at the level of $L_{Aeq} < 30$ dB, i.e. below acceptable values and the level of background. The designed 110 kV station with overhead connection does not pose a threat to noise emission to the environment, including distant residential development. Through the implementation of project solutions of required parameters of sound level, the GPZ station 20/110 kV will not exert negative impact on the neighbourhood.

The designed investment will not exert negative impact on acoustic climate and may operate without limitations during day and night.

The impact on the level of electromagnetic field (PEM).

The GPZ station, WN equipment and 110 kV lines, as a result of operation and sending the energy generated by wind farms, create PEM emission of frequency equal to 50 Hz which may be harmful for people and animals.

Border values of GPZ station of area I where people and animals may stay for an indefinite time amount to: $E = 1$ kV/m and $H = 60$ A/m. Border values of area II where people and animals may stay for a definite time amount to: $E = 10$ kV/m and $h = 60$ A/m.

Area I of PEM emission does not exist, area II is limited only to the area of substation.

Cable lines of 20 kV which send electric energy from the wind farm to GPZ station 20/110 kV, will be situated on the depth of c.a. 1 – 1,2 m ppt. For the reason of their construction and depth of location, cables create PEM only in direct proximity of a cable and they do not go beyond the border of the surface of the earth. Thus, harmful PEM impact of 110 kV cable lines placed underground is not predicted.

The analysis proves to the fact that there are no contradictions against the construction of GPZ station 20/110 kV with overhead connections 110 kV. PEM existing in the area of the station does not cross its borders. There are no threats towards residential development, as it is

situated beyond the range of PEM caused by exploitation of the station (read Appendix No. 3).

Impact on air.

Exploitation of the wind farm and GPZ station will not exercise harmful influence on the condition of atmospheric air. During their operation there are no technological processes that would cause the emission of dusts and gases to the atmosphere.

Impact on people.

The influence on the health and well-being of local inhabitants will be insignificant. Buildings are situated beyond the contour lines $L_{Aeq} = 40$ dB, that is less than provided for by a norm for noise during the night ($L_{Aeq} = 45$ dB)(read Appendix No. 2). Buildings are also located beyond the access of electromagnetic fields influence (read Appendix No. 3).

There may be a feeling of discomfort connected with rotary movement of revolving rotors of wind power plants. There may be an effect of shadow cast by operating shovels and tower of the power plant. However, due to the distance between the towers this factor should be considered unimportant. Another type of impact may be the light reflected against the tower, in particular against the shovels of a rotor. As the tower and shovels of the rotor will be painted with special matt paint, the reflection effect will not take place.

A complex of wind power plants will cause a change of natural landscape which causes the effect of a perception of changed landscape. The issue of wind power plants perception in the neighbourhood is a very subjective issue that depends on a particular observer (Appendix No. 1). A threat for people may appear in an emergency (knocking over of the construction). Since the planned construction is distant from people's houses and meets all norms as far as resistance and loads, its negative impact on people's health and safety is not expected.

Impact on flora.

During operation the wind farm and GPZ station will not exercise harmful impact on flora. No legally protected species or natural habitats important for functioning of the ecological system of Natura 2000 was observed (read Appendix 1).

Impact on fauna.

The designed investment may influence fauna in the scope of migratory routes, reproduction and preying. A detailed analysis of the impact of the undertaking on fauna was presented in Appendix No. 1.

In the area under this analysis no crucial migratory routes of birds and mammals were specified. This investment is localised beyond main migratory routes of birds, therefore it will not pose an obstacle for passages of long-distance migrants (see: figure 6, Appendix 2).

Marshy meadows adjacent to the wind farm are not the rest place of flocks of bigger birds species such as storks, cranes and geese. The bird passages through the proglacial valley, in particular small passerine order are characterised by a wide front low above willow brush and woodlots. However, the route of geese in this area runs above Lędzin and Liwia Łuża lake. The main threat for geese are intensive shootings by hunters (see: figure 6, Appendix 1.).

The passages of birds that prey above fields are safe, as they take place relatively low or along midfield woodlots. The location of designed wind farm is safe, especially for mass migrating of *Anser sp.* geese in this area, because the route of passages (in majority of flocks) runs along Kanał Łądkowski, in other words, beyond the investment area.

A symmetric and regular layout of wind power plants towers provides birds with the possibility of non-collision passage between towers of the power plant situated within 350 – 800 m (see: map 2, Appendix 1). The creation of ecological portals (area between power plant towers groups) provides a possibility of passage into and outside the zone of potential danger, as well as provides the opportunity of habitat transfers in four basic directions.

Other type of a negative impact is exerted by the noise emitted by the rotor operation. Animals that have a higher threshold of sensitivity can hear the sounds from considerable

distance. As a result of minimizing activities, the planned location of places of tower foundations will amount to 100 m from environmentally valuable areas will trigger doing away with this negative impact.

The possible negative influence of power plants on bats will not be crucial. Within the area of investment three single passages of bats were observed. The animals flew to farmlands from local complexes of woodlots. There is little possibility of collision of bats and power plant towers, since these mammals developed a precise apparatus of echolocation which warns them against obstacles. The structures of power plant towers are made of solid cylinder of diameter over 1 m and height of 93 m. Such huge construction creates distinct echo and is perfectly distinguishable around a flying bat. Literature data and field observations prove that the greatest threat for these mammals may be the revolving shovels of the power plant.

Field observations within the area of designed investment proved the lack of crucial routes of migrations of birds and bats. No habitats or priority species for which the area of Natura 2000 - PLB 320017 "Trzebiatów-Kołobrzeg Sea Belt" was created were observed. No priority bird species were detected for the designed OSO of birds Natura 2000 – PLB 320010 "Trzebiatów Refugium". The area of investment is located mainly far from the complex of ecological network Natura 2000 (see: map 2, Appendix 1).

The lack of negative influence on fauna was also proved in an eco-physiographic publication (Horniatko 2004) and the forecast of impact on the environment (Klimek 2004) for this area.

It may be stated that in case of application of proposed minimising activities, possible negative influence of operating power plants and GPZ stations on fauna will not be significant.

Impact on landscape

The influence of operating power plants on the environment results from visual nature of constructions themselves, physiography of the area of investment, as well as settlement culture of this region. A detailed analysis of the impact of this investment on landscape was presented in Appendix 1.

Due to their height, the wind power plants will be a height predominant feature in the landscape. So high objects are a strange, technical element of natural landscape. Owing to the height it is difficult to integrate and mask power plants in the landscape, as they are towering above woodlots. Nevertheless, the presence of forest complexes, woodlots situated midfield or along roads within the area of study contribute to lowering the disharmony of landscape. Observations of other wind farms in the voivodeship show visual disappearance of power plants within the distance of 6 km in the area of variable landform features and masking woodlots. The zoning plan accepts the location of power plants with their towers of up to 105 m and maximum height to 145m of the rotor extreme point. Wind power plants that are planned for exploitation fall into these values.

One of factors that influence the perception of wind power plants is the rotor movement, the number of shovels and the technique of shovel painting. The rotor movement itself may cause “tiredness” of the observer, especially from close distance. However, the feelings of people with respect to wind power plants are very subjective, dependent on personal perception of an individual.

The influence on aesthetic values of landscape is exerted by the technique of power plant painting. Usually it is white or pastel colour which is the least contrasting with relation to background. An important element of power plant perception is placing colourful advertisements on the surface of towers and gondola of the rotor. The zoning plan requires painting the structure bright or pastel as the least contrasting colour with a matt paint which does not create light reflexes.

Power plants will be painted in accordance with requirements of the plan. Polish laws require painting white and red stripes on shovel endings as obstruction marking. it is an element that disturbs the harmony of landscape.

GPZ station will not destabilise natural landscape with the introduction of 110 kV lines. It will be integrated into a line 110 kV and 15 kV which has existed in the neighbourhood for many years. The station will be integrated into the system of existing high voltage lines and steel constructions of lines that have created circuits and predominant features in the landscape for many years. GPZ station will not introduce new negative changes. Land development will not undergo considerable modifications, and the equipment

and area arrangement will become integrated into the neighbourhood and partly masked with woodlots near the station.

The landscape analysis proves that the planned investment will be a new individual element of natural landscape. A crucial exposition of the wind farm disturbing the harmony of landscape will take place from the north-west. From other directions it will be masked and should not considerably influence the deterioration of landscape values.

The spatial structure of the location of power plant towers influences the scenic effect of these investments. Single power plants considerably distant from each other influence a significant delimitation of landscape. Much less substantial effect is produced by power plants in the form of farms situated not far away from each other. Although such structure causes the phenomenon of a kind of visual barrier, it does not delimit the landscape in a considerable way and it makes the observer get gradually accustomed. Such situation of designed wind power plant will contribute to the moderation of its influence on natural landscape.

A crucial element of impact on landscape is the exposure of planned wind farm in the landscape and the settlement structure of the region. The area of planned wind farm is situated on a slight morainic elevation, with its highest peak of 21.6 m above sea level which forms a valley of Kanał Łądkowski. From here, wind power plants will be clearly visible from considerable distance, from the direction of Rewal and Niechorze. The planned wind farm will be visible from the lighthouse in Niechorze (see: pic. 2,3). There are not many woodlots in this area, mainly along the road from the village of Karnice to Skrobotowo. From the north the area of wind farm adjoins Skrobotowo and commune road from Skrobotowo to the village of Kusin. On both sides of the road there are a lot of trees which would mask the power plants. However, the time of drive is very short (c.a. 2 min), and the lack of negative impact on people driving by may be expected. Wind power plants should also be considerably masked from the north by the forested complex near Kusin. It is crucial for the nature reserve "Liwia Łuża" located c.a. 5 km to the north. Observations of other wind farms in the voivodeship indicate visual disappearance of power plants within c.a. 5-6 km in the area of changeable landform features and masking woodlots. Thus, the visual impact on flocks of birds and scenic values should be slight (see: pic. 1, 5). The planned power plants will be clearly visible from the villages of : Skrobotowo, Kusin, Łędzin and Goławice. The view

from other villages will be highly masked by increasing distance, landform features and woodlots (see: pic. 1, 4, 5).

The height of power plants will make them a predominant altitude feature in the landscape. The analysis should focus on other altitude units in the neighbourhood. Near the village of Kusin, in the vicinity of the wind farm, there is a mobile telephony tower of tubular structure.

The influence of planned wind farm on landscape values of nearby Natura 2000 areas, will not be strong and will limit to their outskirts which is due to the presence of forested complexes, midfield woodlots and avenues of trees along commune and field roads which will noticeably mask the power plants in the landscape.

The landscape analysis indicates that the planned wind farm will be a new characteristic element of natural landscape. A critical exposure disturbing the harmony of landscape will be situated to the north-west (see: pic. 1, 2). From other directions it will be masked to a varying extent and should not considerably influence the deterioration of scenic values.

Waste.

In the process of wind farm and GPZ station exploitation waste will not be formed. The operation of the station will not cause harmful emissions of substances, pollution, sewage or waste, with the exception of small amounts connected with conservation operation of technical devices. Any such waste should be collected by technical staff of the investment and transported beyond the limits of designed undertaking to the waste stockpile or transferred to proper entities to be recycled.

For energy generation and transfer the designed investment will apply technologically advanced devices protected from the possibility of emergencies. On this stage, it is possible that an insignificant amount of waste will be formed as a result of current maintenance of devices. The maintenance crew will regularly pick them and transport to the waste stockpile if necessary.

As wind power plants and GPZ station are self-service facilities, no construction of sanitary and social facilities and, consequently, no creation of household sewage are expected.

10.3. Impact on liquidation phase

The designed investment of wind power plant and transformer substation construction will wield minor influence on the elements of environment in the process of its liquidation. There may be a slight disturbance of cover layer of soil due to the disassembly and transport of components of power plant, station, roads and energetic lines construction. Demolition works will produce some waste. Construction elements as waste in the form of iron metals (code 16 01 17) and concrete debris (code 17 01 01) must be transported to proper stockpiles. There will be a periodical rise in pollution and noise emission connected to construction and transportation equipment operation. There are no prospects of impact on flora and fauna in the course of liquidation.

10.4. Impact of the venture on forms of environment preservation

No legally protected areas were observed within the limits of planned investment. In the vicinity of the investment there are territories of an ecological system called Natura 2000: SOOS "Trzebiatów-Kołobrzeg Sea Belt" PLH 320017 and OSOP "Trzebiatów Refugium" PLB 320010 (see: map 2, Appendix 1). The majority of both units is situated from 2.4 to 4 km away from the northern border of wind power plants location. Moreover, there is "Liwia Łuża" natural reserve within 4 km (see: map 2, Appendix 1).

In adjacent and neighbouring areas there environmentally valuable locations are designed, such as: OChK-1, the Area of protected landscape; UE – 2, Ecological use "Lędzińskie Rozlewisko"; OC – 1, OC – 2, OC – 3, OC – 4, OC – 17, Environmentally valuable areas. Three of them: OChK-1, OC – 2 and OC – 3 border directly with the limits of investments (see: map 2, appendix 1). A part of area of planned GPZ station coincides with a designed environmentally valuable area (OC-3) where western marsh orchid positions were detected. In order to eliminate the destruction of the positions, before the construction the endangered species must be transferred to nearby OC-3 area.

Negative impact on the afore said areas will not be significant.

In the course of studies, no habitats or priority species for which the area of Natura 2000 PLB 320017 "Trzebiatów-Kołobrzeg Sea Belt" was founded were detected. Bird species being a priority for designed OSO in accordance with Natura 2000 – PLB 320010 "Ostoja Trzebiatowska" were not observed.

On account of that it may be assumed that with respect to protected areas:

- no negative influence on "Liwia Łuża" nature reserve is anticipated,
- no critical negative influence on environmentally valuable areas designed to be protected: OChK-1, OC-1, 2, 3, 4, 17 is anticipated,
- there is no important negative impact of the planned investment on a special area of habitats protection called Natura 2000 PLB 320017 "Trzebiatów-Kołobrzeg Sea Belt"
- no important negative influence of planned investment on the designed area of special protection of birds called Natura 2000 PLB 320010 "Ostoja Trzebiatowska"
- the petitioned investment does not cross or coincide with the area of Natura 2000. It does not divide areas located in its vicinity from other elements of Natura 2000 in the region of Western Pomerania.

10.5. Impact of the venture on historical monuments and cultural landscape

Within the area under study there are two archaeological positions protection zones and the K zone of landscape protection entered into the register of the Regional Monument restorer. Archaeological positions protection zones (see: map 2, Appendix 1):

- W II archaeological positions partial protection zone no. 21 pos. 3 (AZP: 17-10/28),
- W III archaeological positions limited protection zone no. 123 pos. 3 (AZP: 17-10/28) and no. 124 pos. 4 (AZP: 17-10/29).

The afore mentioned zones cover archaeological monuments of former human activity and early settlement in these areas.

In the vicinity of the area of study, c.a. 2.5 km away of the village of Lędzin there is a Dutch mill once destroyed, at present restored and inhabited by private owner. This unit is entered into the register no. 510.

To the material culture units specific for this region belong the arrangement nature of the villages of Skrobotowo, Lędzin, Czaplin Wielki and Gocławice known as linear villages.

As the foresaid units are located beyond the area of direct construction works, no negative impact of designer investment on monuments and cultural landscape is anticipated.

10.6. Possible transboundary impact

The designed investment in construction of 13 wind power plants, GPZ station with auxiliary structure does not have transboundary nature.

10.7. Results of possible break-down

During the course of exploration of wind power plants and GPZ there is a risk of emergency situations such as falling over of the tower structure or possible oil leakage from damaged GPZ station.

The falling over of the structure of power plant tower is quite impossible. However, power plants must be located within distance that would prevent environmental losses in case of a catastrophe. Such distance (100 m) was applied in the process of location of power plant towers in order to minimise possible losses in flora. There is little likelihood of the impact of the catastrophe on fauna.

The exploitation of the transformer substation may result in the damage to the substation and consequent oil leakage. There is a prospect of placing a tight oil bowl which would collect over 100% of oil volume in the transformer. Possible influence on soil and flora will not be considerable. The GPZ failure should not influence fauna in any way.

In case of any afore mentioned failures, the executor of the investment shall be obliged to compensate for any and all environmental losses.

11. Description of potentially significant impacts of the planned venture on environment

11.1. Resulting from existence of the venture.

Designed venture will not significantly influence the abiotic and biotic environment. This is a pro-ecological investment, producing electric power from renewable energy sources without polluting the environment. As was mentioned earlier, wind farms might influence the environment mainly through noise emission. They directly influence the areas around the places of their foundations. As the distance increases, the acoustic effect is reduced. Indirectly, they influence the fauna of the area of the analysis and the neighbouring areas, this issue has been discussed in chapter 10 of the report and in appendix 1. Planned venture, which is the subject of the report, with other objects causing emissions may produce cumulated influence. In Karnice there is a lack of industrial plants, however two locations of wind farms' complexes are planned. They are in different stages of design works. The first location is planned to the east of Lędzin village, the second in the area of Czaplin Mały and Czaplin Wielki villages. If both projects will be realized, they will, with the area of this analysis, constitute a line of towers which will establish a kind of physical barrier. Planned wind farm to the east of Lędzin (to the north of area of this analysis) has been wrongly located, because it stands on the route of birds' migrations. Total impact of "Karnice" power plant and near Czaplin Mały and Wielki villages, despite establishing physical obstacle, will be minor, due to the location in the distance (they are separated by forest complex, which establishes a safe route for animals' migrations), from the main birds' migration routes and valuable areas of their occurrence.

In Świerzno which is located in the vicinity of the area of the designed wind farm there are two designed wind farms. However, in case of their launch, because of considerable distance 9,5 and 10 kilometres, they will not influence the natural environment together. In the remaining neighbouring communities no working wind farms have been found. There are also no other planned wind farms.

In the time scale, the planned investment of wind farms' construction will make ecologically positive impact on the environment: momentary, steady, short-term, medium-term and long-term impact.

11.2. Resulting from exploitation of environmental reserves

Within the framework of investment's exploitation non-renewable environmental reserves will not be used.

11.3. Resulting from emission

During the exploitation of planned investment, pollution will not be emitted and will not pass to the environment. Designed venture belongs to ecological activities. During the wind farm's work so-called clean energy is produced.

12. Description of expected actions for the purpose of preventing, limiting and environmental compensation for the possible negative environmental impacts of the venture

In order to minimise possible negative impact of wind farms' and transformer substation's on the environment, during the realisation phase and investment's functioning, actions for the purpose of preventing, limiting and environmental compensation have been taken.

Limiting and preventive actions:

Realisation phase:

- building works will be conducted from 6 a.m. till 10 p.m., in order to limit the increase of noise produced by building machines and the delivery of building materials,
- during the farms' construction ready-made parts put into a whole will be used in the installation area,
- during building-installation works the soil's layer, to be re-used later, should be properly stored in order to restore it to the beginning state after the end of construction,
- building wastes will be delivered to an assigned waste deposition site or to the landfill site,
- after the end of building-installation works the area around the towers should be restored to original state,
- possible losses in vegetal cover should be restored,
- in the area of archeological stands' protection zone all engineering and building works should be agreed with Voivodship Conservator of Monuments.

Exploitation phase:

- locations of individual towers have been moved to 100 metres from bushes, trees and forest complexions in the southern and eastern part of investment's boundaries,
- the farms' towers are located in the distance no shorter than 400 metres from residential area in order to fulfill the conditions resulting from permissible noise's norms,
- in the towers' construction pipe building has been used, which influences birds to a lesser degree than frame body,
- planned wind turbines are equipped with modern technological solutions that assure fewer noise emissions to environment,
- in a wind farm one type of power plants will be used,
- in order to eliminate the light reflections' occurrence, towers and rotor blades will be painted in bright, pastel or mat colours,
- it is not recommended to place any advertisements on towers and wind gondolas, only producer's logo harmonising with the tower's and gondola's colour is permissible, lighting has been installed in the towers in order to eliminate bird-strikes at night,

- in case of any deaths of birds, especially of rare species, during the migration or during incubation period, actions alleviating negative impacts on birds must be taken immediately.

Liquidation phase:

- works should be conducted from 6 a.m. until 10 p.m. in order to eliminate noise connected with means of transport and building machines' work,
- possible waste should be delivered to marked areas of an assigned waste deposition site or to the landfill site.

Compensation actions:

- after the end of building works or investment's liquidation, original character of the area should be restored in the direction of agricultural use, reclamation of places where access roads and wind farms' foundations were should be conducted,
- in case of possible constructions' collisions with birds, the investor should take actions in order to eliminate them and to compensate for environmental losses in agreement with the Voivodship Conservator of Nature,
- in case of possible plant's tower's catastrophe the investor is obliged to repair all damages which occurred in the environment as a compensation.

13. Proposals of monitoring the impact of the planned venture

13.1. Proposals of monitoring in construction phase

During the construction phase following activities should be controlled:

- construction – installation works' conduct, especially if there are no damages to trees and mid-field bushes,
- the height of noise emission.

13.2. Proposals of monitoring in operation phase

During the exploitation:

- it is recommended to make acoustic climate's measurements of wind farms and GPZ substation after the beginning of exploitation, in the same control points as before the beginning of the investment (methodology in Appendix 2),

- it is recommended to make control measurements of GPZ substation's electromagnetic field, after the beginning of exploitation (methodology in Appendix 3),

- pro-investment monitoring, regarding the environment, is recommended within the scope of:

1. reproduction birds – through the assessment of the changes in quantity and quality of investment's area's bird fauna and in the vicinity of:

a) area directly adjoining farms' areas on randomly chosen surface,

b) it is recommended to take control emission measurements PEM on the boundary of GPZ substation's area, in the first year of its exploitation,

c) the villages' area with the passerine birds' (*Passeriformes*) density,

d) the quantity of reproduction storks *Ciconia ciconia* and owls *Strigiformes* within a radius of 5 kilometres from the investment's area,

e) on the group of birds of open grass areas of Świnica Valley about 0,5-1,0 kilometres to the west from Skrobotów,

2. on the birds of passage – monitoring the mortality of migrating birds of passage during the period of spring and autumn migrations, especially including waterfowl (swans *Cygnus sp.*, geese *Anser sp.* and ducks *Anatidae*), wading birds (cranes *Grus grus* and storks *Ciconia sp.*) and birds of prey (falconiformers *Falconiformes* and owls *Strigiformes*),

3. it is necessary to conduct three-year monitoring of investment's impact on the environment, mainly of bird fauna and bats, from the moment of launching the wind power-plants.

13.3. Proposals of monitoring in liquidation phase

In this phase the investment's area should be restored to original state, the one from before the beginning of construction.

14. Analysis of possible social conflicts connected with the planned venture

During the construction and especially the exploitation social conflicts might occur. Possible protests might be connected with too close location to areas environmentally rich, fears of spoiling the landscape values, too intense noise or enlarged emission of electromagnetic fields.

Fears of negative impact on the environment of venture's area and neighbouring areas environmentally rich seem to be devoid of substantial basis. The following analysis shows lack of significant negative influences of the investment on individual elements of environment, especially birds. The basis for this statement is a year monitoring of fauna, which was conducted. On its basis it was proved that there is no impact on the bird fauna, especially on their migration's routes (appendix no. 1).

The fears of possible spoiling of landscape values might result from subjective feelings of individual inhabitants of local communities. Possible protests might be emotional, which is understood due to people's different feelings concerning the wind farms (appendix no. 1)

Taking into account :

- the fact that there is the lack of influence on local communities' residential area, including kindergartens, schools and hospitals,
- the use of modern technical and ecological solutions preventing and limiting the impact on the environment,
- the lack of significant impact on environment, including the acoustic climate, electromagnetic fields' emissions, reproduction places and birds' migration routes and ecological system of areas under protection Nature 2000,
- receivers' increased energetic needs and the area infrastructure's development,
- investment's positive influence on economic situation of Karnice community,

- projects' consistency with the regulations of Karnice Commune Head from January 26, 2006 No. BGK-7624/4/2006 concerning the predetermination of the scope of the report regarding the venture's impact on the environment,

- project's consistency with the resolution No. XIX/127/2004 of Commune Council of Karnice from August 28, 2004 concerning the zoning plan for wind farms' locations, within the limits of Lędzin, Gochłwice, Kucin, Drozdowo and Karnice commune.

- no notices have been passed by local inhabitants on the earlier planning phases, not many such actions should be expected to occur in future.

In order to eliminate possible conflicts, educational actions should be taken, i.e. meeting the interested in order to present the assessment of dangers and actions taken to eliminate them. Economic profits and investment's ecological values for local society resulting from wind farms' exploitation should also be presented.

15. Difficulties resulting from shortage of technology or gaps in modern knowledge

During the analysis of the investment's impact's on individual elements of environment, insufficient level of knowledge about the wind farms' impact on fauna, especially birds, have been observed. In order to receive detailed information about the impact of such ventures on birds, since spring 2006 steady ornithological monitoring has been conducted, which was ordered by the investor (methodology of monitoring in chapter 2, appendix 1).

16. Conclusions

During the analysis of gathered material following conclusions were drawn:

a) No negative impact of planned investment on local environmental resources' of place assigned to the investment has been proved.

b) Planned venture of wind farms's construction, GPZ substation with auxiliary infrastructure will not cause the violation of environmental standards, because it does not emit the noise and electromagnetic fields to the residential areas, does not cause land-water

changes, does not emit pollution or greenhouses gases to the atmosphere and does not produce sewage, substances or waste dangerous to the environment.

c) No negative impact of the investment on atmospheric air has been proved. The realisation of this venture will contribute to improvement of the state of air and reducing greenhouse gases' emissions.

d) No negative impact of the investment on underground and surface Waters has been proved.

e) No significant, negative impact of planned investment on landscape values of the area which is the subject of this analysis has been proved.

f) No negative influence of the investment on monuments and cultural goods of the area which is the subject of this analysis has been proved.

g) No significant, negative impact of planned investment on special area of habitats' protection Nature 2000 PLB 320017 „Trzebiatowsko-Kołobrzski Seaside Route” has been proved.

h) No significant, negative impact of planned investment on designed area of special birds' protection Nature 2000 PLB 320010 „Ostoja Trzebiatowska” has been proved.

i) Due to the lack of migratory birds' flight routes in the area covered by this analysis no negative impact on planned investment on their resources and the resting or feeding places during the seasonal journeys in the venture's investment area.

j) Due to towers' location's separation from objects environmentally rich, no negative impact on valuable flora's and fauna's species as well as areas planned to be protected or nature – protection areas is expected.

k) In case of meeting the minimal suggestions included in this report the planned investment of wind farms' and transformer substation's construction will not unfavourably influence the surrounding environment.

The data gathered, planned or taken minimising actions prove that designed investment of wind farms' construction, GPZ substation with auxiliary infrastructure

will not have significant, negative impact on investment area's environment, adjoining area, on abiotic elements of existing and designed areas environmentally rich, on Nature 2000 areas' continuity and the habitats, plants or animals of Nature 2000 area.

Designed venture meeting the environmental-protection conditions, wildlife protection and the area's usage rules may receive positive decision concerning the investment's environmental considerations.

17. Summary in non-specialist language.

Increasing social pressure concerning the improvement of cleanness of surrounding environment causes the increase in the interest about environmentally-friendly and renewable energy resources. From 19th century till today the average temperature in the world has increased by 0,7⁰C. According to WWF as high as 37% emissions of gas come from the production of energy from fossil fuels. The development of wind energetics, called clean energy, contributes to reducing natural environment's pollution and more effective protection of plants and animals.

Wind farms' and GPZ transformer substation's with auxiliary infrastructure location is designer in the area of this report. Planned wind farms will be located on the premises of Lędzin, Gocławice, Kusin, Drozdowo in Karnice commune. Designed transformer substation will be located in Drozdowo village.

Detailed analysis of individual elements of natural environment is included in appendixes..

Materials presented in the analysis are the result of long-term observations of investment areas' natural resources and adjoining areas. In the analysis, birds whose pre-investment monitoring has been conducted on the investor's order since spring 2006, were analysed in detail .

The analysis presents the impact of wind farms' and GPZ substation's planned investment on environment of the area which is the subject of this report.

The area which is the subject of this report mainly belongs to agriculture areas with the dominance of cereal's monoculture. It is located on bottom-moraine plain built from drift clay.

It is an open area, rather flat with few elevations. In the middle part it is crossed by the draining canal which goes from north to south. The investment's area is practically devoid of bigger bushes and trees.

In the area which is the subject of the analysis no legally protected areas have been found. In the neighbouring areas there is legally protected area, nature reserve „Liwia Łuża”, special area of habitats' protection (SOOS) PLH 320017 „Trzebiatowsko-Kołobrzski Seaside Route” and the area of special birds' protection OSOP PLB 320010 „Ostoja Trzebiatowska” and areas designed for protection OChK - 1, 1 ecological use, 5 areas environmentally rich.

It has been proved that in the area of planned wind farms' investment especially animal species considered cosmopolitan, popular in the country's area and in Western Pomerania. Fauna in that area is connected mainly with agricultural cultivation, preferring open areas or mid-field trees. During area works 118 species of birds were found, mainly in the areas adjoining or in the vicinity of the investment's area. Apart from birds, bats and bigger mammals, mainly game species, due to the vicinity of forest complexes were observed. These were mainly roes, boar, sometimes rabbits.

Designed investment is located in the vicinity of tracks and migratory routes of birds of passage. No migratory routes of birds or bats have been found.

Because of the fact that planned location of wind farms' towers is separated from environmentally rich areas' boundaries which are situated in the vicinity and which are birds' migratory routes, their impact on birds flights' routes will be minor.

In the area of wind farms' locations there are no plant species legally protected or endangered.

No plant species or priority habitats for which „Trzebiatowsko-Kołobrzski Seaside Route” – PLB 320017 has been made were observed in the area of planned investment. Due to the separation, wind farms will not influence plant species or priority habitats of this area.

Because of the fact that the investment is located on the side of main birds' migratory routes, it will not be a barrier during the journeys of long-distance migrants.

Areas' observations in the area of planned investment showed lack of significant birds' or bats' migratory routes. No priority birds' species for designed OSO of birds Nature 2000 – PLB 320010 „Ostroja Trzebiatowska” were found.

It can be certified that the impact of wind farms' on fauna will be minor, with the use of minimising actions.

The investment does not cross and is not located in the areas of Nature 2000. It does not separate nearby areas from other elements of Nature 2000 net on the Western Pomerania. The data gathered allow to claim that planned investment will not influence the continuity of existence of Nature 2000 areas in the Wesernt Pomerania.

Designed investment does not have transboundary influence.

Designed investment does not have a negative impact on acoustic climate and electromagnetic fields of the areas mentioned in the analysis.

In order to minimise possible negative wind farms' and transformer substation's impact, in the realisation phase and investment's functioning on environment limiting, preventing and compensation actions have been taken. .

Limiting and preventing action:

Realisation phase:

- building works will be conducted from 6 a.m. till 10 p.m., in order to limit the increase of noise produced by building machines and the delivery of building materials,
- during the farms' construction ready-made parts put into a whole will be used in the assembly site,
- during building-installation works the soil's layer, to be re-used later, should be properly stored in order to restore it to the beginning state after the end of construction,
- building wastes will be delivered to an assigned waste deposition site or to the landfill site,
- after the end of building-installation works the area around the towers should be restored to original state,
- possible losses in vegetal cover should be restored,
- in the area of archeological stands' protection zone all engineering and building works should be agreed with Voivodship Conservator of Monuments.

Exploitation phase:

- locations of individual towers have been moved to 100 metres from bushes, trees and forest complexions in the southern and eastern part of investment's boundaries,
- the farms' towers are located in the distance no shorter than 400 metres from residential area in order to fulfill the conditions resulting from permissible noise's norms,
- in the towers' construction pipe building has been used, which influences birds to a lesser degree than frame body,
- planned wind turbines are equipped with modern technological solutions that assure fewer noise emissions to environment,
- in a wind farm one type of power plants will be used,
- in order to eliminate the light reflections' occurrence, towers and rotor blades will be painted in bright, pastel or mat colours,
- it is not recommended to place any advertisements on towers and wind gondolas, only producer's logo harmonising with the tower's and gondola's colour is permissible, lighting has been installed in the towers in order to eliminate bird-strikes at night,
- in case of any deaths of birds, especially of rare species, during the migration or during incubation period, actions alleviating negative impacts on birds must be taken immediately.

Liquidation phase:

- works should be conducted from 6 a.m. until 10 p.m. in order to eliminate noise connected with means of transport and building machines' work,
- possible waste should be delivered to marked areas of an assigned waste deposition site or to the landfill site.

Compensation actions:

- after the end of building works or investment's liquidation, original character of the area should be restored in the direction of agricultural use, reclamation of places where access roads and wind farms' foundations were should be conducted,

- in case of possible constructions' collisions with birds, the investor should take actions in order to eliminate them and to compensate for environmental losses in agreement with the Voivodship Conservator of Nature,
- in case of possible plant's tower's catastrophe the investor is obliged to repair all damages which occurred in the environment as a compensation.

18. Information sources constituting grounds for report preparation

Detailed information sources constituting grounds for report preparation are included in partial analyses enclosed to the report in the form of appendixes.

- Appendix No 1 - Dariusz Janicki, Robert Kościów 2006. Environmental impact assessment of Karnice" Wind Farm Complex as regards environment protection. Typescript,
- Appendix No 2 - Tomasz Andrzejewski 2006. Impact assessment of noise emitted to environment from designed Wind Farm Complex -"Karnice". Typescript,
- Appendix No 3 - Stanisław W. Wierzbicki 2006. Influence of electromagnetic field and noise on construction environment of Skrobotowo and user transformer substation 20/110 kV for the purpose of Karnice wind farm complex.Typescript,
- Appendix No 4 - Krzysztof Szyłański, Michał Szyłański, Grażyna Szyłańska 2006. Geological opinion for the purpose of environmental impact report on the planned investment. "Karnice" Wind Farm Complex. Skrobotowo, Karnice commune, gryficki powiat. Typescript.