PROJECT INFORMATION SHEET

SUBJECT OF THE STUDY:

Construction of the "Zambrów" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 12 MW

ADDRESS OF THE FACILITY:

Zambrów,
cadastral district 0001 – Zambrów
Zambrów municipality, Zambrów district,
Podlaskie voivodeship
Plot of land No. 1910/11

INVESTOR:

GP ENERGY Sp. z o.o.
ul. Ks. J. Popiełuszki 65A,
97-200 Tomaszów Mazowiecki

…… ……

Prepared by Signature of the Investor

COPY No. 1

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1. PURPOSE AND SUBJECT OF THE STUDY

The subject of this study is the information sheet for the project involving a comprehensive construction of the "Zambrów" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 12 MW. The planned investment project will be located on a plot of land No. 1910/11 with a total area of 23.37 ha in Zambrów, Zambrów municipality, Zambrów district, Podlaskie voivodeship. The plot is owned by a private owner, who is willing to give the land to the Investor for a long-term lease with the right to build on this land technical infrastructure devices in the form of the "Zambrów" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 12 MW.

Table No. 1. List of plots intended for investments and their owners.

Plot numbers	Owners	Home address
1910/11	Osler Diana	Ul. Warsztatowa 6B 04-803 Warszawa

The information sheet for the planned project is an appendix to the application for issuance of the decision on environmental conditions of the consent for implementation of the project.

The scope of the Information Sheet is compliant with Article 3 section 1 point 5 and Article 63 section 1 of the Act of October 3, 2008 on providing information about environment and its protection, participation of the general public in the environmental protection and about environmental impact assessments (Journal of Laws 2017.0.1405, consolidated text).

2. LEGAL BASIS FOR THE STUDY

The following information on the construction of a photovoltaic system meets the requirements relating to the *project information sheet* set out in Article 3 section 1 point 5 of the Act of October 3, 2008 *on providing information about environment and its protection, participation of the general public in the environmental protection and about environmental impact assessments* [Journal of Laws 2017.0.1405, consolidated text].

In preparing this study, the investor's obligation was fulfilled, specified in Article 74 section 1 of the aforementioned Act, in conjunction with the provisions of the Ordinance of the Council of Ministers of November 9, 2010 on the determination of types of projects that may have a significant impact on the environment and on detailed criteria for project qualification for the obligation to prepare an environmental impact report [Journal of Laws of 2010 No. 213, item 1397].

In accordance with the provisions of the aforementioned legal acts, the planned investment project is included in the category of projects that *may potentially significantly affect the environment*, for which the obligation to prepare an environmental impact report of the project may be determined or waived by way of a decision of the competent authority pursuant to Article 63 section 1 of the Act of October 3, 2008 *on providing information about environment and its protection, participation of the general public in the environmental protection and about environmental impact assessments (so-called Group II)*.

The relevant requirements of the following legal acts have been considered in the preparation of this "Information Sheet":

- Act of October 3, 2008 *on providing information about environment and its protection, participation of the general public in the environmental protection and about environmental impact assessments* (Journal of Laws 2017.0.1405, consolidated text);
- Act of April 27, 2001 – *Environmental Protection Law* (Journal of Laws 2017.0.519, consolidated text);
- Act of April 16, 2004 on *nature conservation* (Journal of Laws 2018.0.142, consolidated text);
- Ordinance of the Council of Ministers of November 9, 2010 *on the determination of type of business that may have a significant impact on the environment and on detailed criteria for business qualification with respect to the obligation to prepare an environmental impact report* (Journal of Laws of 2016, item 71);
- Ordinance of the Minister of Environment of June 14, 2007 *on the permissible noise levels in*

the environment (Journal of Laws of 2014, item 112);

- Ordinance of the Minister of Environment of July 24, 2006 *on conditions to be fulfilled while discharging wastewater to water or ground, and on substances particularly harmful to water environment* (Journal of Laws of 2006 No. 137, item 984, as amended);

- Ordinance of the Minister of Environment of September 5, 2007 amending the Ordinance *on areas of special protection of birds Natura 2000* (Journal of Laws of 2008, No. 198, item 1226).

3. INVESTOR

The investor applying for the issuance of the decision on environmental conditions for the implementation of the project consisting in the construction of the "Zambrów" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 12 MW.

GP ENERGY Sp. z o.o.

ul. Ks. J. Popiełuszki 65A,

97-200 Tomaszów Mazowiecki

4. TYPE, SCALE AND LOCATION OF THE PROJECT

The project is included in the group of renewable energy sources (RES). The idea is to build and then operate the "Zambrów" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 12 MW producing electricity from the sun. The planned photovoltaic park will be located on a plot of land No. 1910/11 in the southern part of Zambrów.

The "Zambrów" photovoltaic park will be implemented in the following options:

1. **12 photovoltaic power plants with a capacity of up to 1 MW;**
2. **1 photovoltaic power plant with a capacity of up to 12 MW.**

For the area covered by the application the Local Development Plan for the Zambrów Municipality has not been adopted.

Map with the Master Plan for the Zambrów Municipality for the area covered by the application – Appendix No. 4.

4.1. Main technical parameters

The planned "Zambrów" photovoltaic park will produce electricity, in the process of using solar energy, in the amount of:

- **System of up to 1 MW each – about 1100 MWh/year each.**
- **System of up to 12 MW – about 13 000 MWh/year.**

To produce the above-mentioned energy, it is necessary to install: for a single farm with a capacity of up to 1 MW each – up to 3,570 photovoltaic panels with a sample nominal capacity of 280 W (the number of panels depends on the capacity of the panel, which ultimately will be included in the building permit design and later in the detailed design), while if the investor decides to build one power plant with a capacity of up to 12 MW – up to 42,856 photovoltaic panels with a sample nominal capacity of 280 W (the number of panels depends on the capacity of the panel, which ultimately will be included in the building permit design and later in the detailed design),

For power plants up to 1 MW, the installed capacity cannot exceed 1 MWp, while for power plants up to 12 MW, the installed capacity cannot exceed 12 MWp.

The table below shows the maximum and minimum number of photovoltaic panels depending on the installed capacity of the photovoltaic panels:

Photovoltaic power plants with a capacity of up to 1 MW each			Photovoltaic power plant with a capacity of up to 12 MW		
PANEL CAPACITY [W]	NUMBER [pcs]		PANEL CAPACITY [W]	NUMBER [pcs]	
	Min. number	Max. number		Min. number	Max. number
270W	3694	3702	270W	44426	44444
275W	3628	3636	275W	43620	43636
280W	3562	3570	280W	42840	42856
285W	3500	3508	285W	42088	42104
290W	3440	3448	290W	41362	41378
295W	3380	3388	295W	40660	40676
300W	3324	3332	300W	39984	40000
305W	3270	3278	305W	39328	39344
310W	3216	3224	310W	38692	38708
315W	3166	3174	315W	38078	38094
320W	3116	3124	320W	37484	37500

Installation of tables for photovoltaic panels does not require anchoring to concrete foundations. The tables will be anchored directly to the ground with galvanized steel poles piled at the appropriate depth.

The conversion of the direct current produced in the photovoltaic panels to alternating current will take place in devices called inverters. The investor plans to install three-phase inverters. The number of photovoltaic inverters will range from 5 to 30 pcs for systems with a capacity of up to 1 MW each, while for one system with a capacity of up to 12 MW the number of inverters will range from 50 to 400. The number of inverters will depend on their capacity, to be specified at a later stage, i.e. when drawing up the design documentation. The maximum sound power level of a single inverter will not exceed 50 dB.

An additional necessary component of photovoltaic systems will be container transformer stations with switchgears. The final parameters of transformer stations and their number will be determined at the design stage.

In the transformer and switching substations at the photovoltaic power plant site, oil-filled transformers will be used that have an oil bund that holds 100% of the transformer oil, which indicates that the groundwater environment is protected.

The maximum sound power level of the transformers used will not exceed 55 dB.

The planned "Zambrów" photovoltaic park will be connected to the power grid. The option assuming the construction of 12 photovoltaic power plants with a capacity of up to 1 MW each, provides for the connection of individual power plants by means of MV service lines to the MV switching station (RSN-15 kV), which may be located on a separate part of the plot of land No. 1910/11, from where a MV-15 kV cable line will be led out directly to the Zambrów Main Power Supply Point located approx. 1 km to the north of the planned investment project. The second option assuming construction of one farm with a capacity of up to 12 MW will also be connected to the MV-15 kV switching station and, as in option 1, MV-15 kV cable line will be led out directly to the Zambrów Main Power Supply Point. The final location for connection of the planned "Zambrów" photovoltaic park will be developed at the stage of the building permit/detailed design after obtaining technical conditions for connection to the DSO network issued by PGE Dystrybucja, Białystok Branch.

Execution of excavations for power cables will not involve cutting of any trees, moreover, the excavations will not cross any watercourse or land drainage channel.

During the implementation phase of the project, consideration should be given to the safety of animals that may be on migration and foraging during this time. When digging trenches for power cables, the contractor must check whether there are no animals trapped in the cable trench immediately before backfilling. In the event that an animal has entered the excavation, the animal must be allowed to leave the excavation safely.

A similar situation will occur during the preparation of the site for transformer stations and MV-15 kV switching stations. Immediately before their foundation, it is necessary to check whether there are no animals within the range of the work, and if so, allow them to move safely out of the construction area.

4.2. Location of this investment project in relation to existing development.

The implementation of the Applicant's investment plan involving the construction and commissioning of the "Zambrów" photovoltaic park is to be located in Zambrów (Zambrów municipality, Zambrów district, Podlaskie voivodeship) on a plot of land No. 1910/11 with a total area of 23.37 ha. The area for the investment project is located on the southern outskirts of Zambrów in a location favorable for the location of such facilities.

Location of the plot in relation to the nearest existing residential development:

- from the north – at a distance of approx. 800 m;
- from the south – at a distance of approx. 100 m;
- from the west – at a distance of approx. 100 m;
- from the east – at a distance of approx. 1,300 m.

Access to the plot where the "Zambrów" photovoltaic park with a total capacity of up to 12 MW will be located will be provided via the existing internal road designated as a plot of land No. 1910/10 and then via unpaved access roads shown in Appendix No. 1.

A map with the location of the plot in question and the preliminary concept of the "Zambrów" photovoltaic park with a total capacity of up to 12 MW is presented in Appendix No. 1. Plot numbers and owners are shown in Table No. 1 (page 4).

4.3. Relations with other projects, in particular cumulative impacts of projects in the immediate vicinity.

The primary purpose of building renewable energy sources (RES) is not the additional electricity generation but reduction of flue gas emission from stacks of coal power plants. RES power plants do not emit additional pollution, but they reduce it.

When the RES is integrated into the power system, at the same moment the automation reduces the production of exactly the same amount of electricity in the system power plants, thus reducing the combustion of coal.

Article 141 of the Environmental Protection Act of April 27, 2001 reads as follows: section 1 "Operation of the system or equipment will not result in exceeding the emission standards", and section 2 "the impact of the system or device should not cause deterioration of the environment to a large extent or hazard to human life or health".

When analyzing the possibility of cumulative impacts of the planned investment projects, both in the execution and operation phases, other projects generating similar types of emissions shall be taken into account.

In the case of option 1, which assumes the construction of 12 photovoltaic power plants with a capacity of up to 1 MW each, there is a possibility of cumulative impact due to the fact that the power plants will be built in the immediate vicinity (each power plant will have a separate fence), but the cumulative impact will be limited to the boundary of plot of land No. 1910/11.

The greatest anticipated impact of the investment project on nature and the environment will occur during the project implementation period, in connection with construction works, as well as with the work of heavy equipment. At that time, there will be increased noise, but it will not cause a nuisance to nearby residents. Additionally, this disruption will be of short duration and limited to daylight hours.

The operation process itself poses no threat in any way. Cumulative impacts will increase, among other things:

- the area of land to be occupied by a total of 12 power plants with a capacity of up to 1 MW each;
- number of inverters;
- number of photovoltaic panels.

In the case of option 2, which assumes the construction of one photovoltaic power plant with a total capacity of up to 12 MW, there is no possibility of cumulating impacts due to the fact that the scope of impacts will be enclosed within one common fence for the entire farm on plot of land No. 1910/11.

Knowing that there are no above-normative, nuisance types of emissions to the environment (such as noise, post-production waste) this will not have a negative impact on the environment.

In contrast, during the construction and dismantling process, only their duration will increase.

Photovoltaic power plants, as a rule, are created to protect the environment as well as are the most environmentally friendly of all RES technologies available at this time.

5. SITE CHARACTERISTICS AND PLANNED SITE FENCING AREAS

5.1. Site characteristics.

Location of the "Zambrów" photovoltaic park with a total capacity of up to 12 MW is predicted on the area of approx. 23.37 ha which is the whole plot of land No. 1910/11. The plot is located in Zambrów, Zambrów municipality, Zambrów district, Podlaskie voivodeship.

The area of the planned project currently consists of agricultural land.

Photos showing the plot are attached in Appendix No. 3.

Land use will change during implementation and operation of the project. The biological activity of the project site will be preserved with the exception of a small area occupied by metal poles on which photovoltaic panels and transformer stations will be mounted. During the construction works, the area intended for the investment project will be fenced, and dangerous places – posing a threat to human health and life – will be specially marked. Internal unpaved roads will also be constructed, which will be used mainly for transportation of materials necessary for construction of the system, staff and sanitation rooms will be provided for the employees. Storage areas for materials and products, as well as containers for temporary storage of waste, will be arranged in a designated place on the project site.

The photovoltaic system implementation stage includes the following construction works:

- preparatory works;
- civil works (installation of tables and construction of fence with gates and wickets);
- installation works (installation of photovoltaic panels, inverters with systems and devices, transformer stations and power cables);
- cleanup works.

5.2. Planned areas for site fencing.

It is planned to fence the project site with a mesh fence without a fence base.

The "Zambrów" photovoltaic park with a total capacity of up to 12 MW will be built on a plot of land No. 1910/11.

Option 1 (12 power plants with a capacity of up to 1 MW) provides for fencing off each of the twelve photovoltaic farms. The area of each farm to be fenced will be provided for at the building permit/detailed design stage.

Option 2 (1 power plant with a capacity of up to 12 MW) provides for fencing the entire area of the photovoltaic farm. The total area to be fenced off will amount to 23.37 ha, i.e. the entire area of the project site.

The fence will consist of steel posts driven into the ground, mesh fence with necessary accessories, which will be suspended at a height of approx. 10 cm above the ground, which will not pose a barrier to the movement of small animals within the project site.

Conceptual land development plan (Appendix No. 1).

6. DESIGNED CONCEPT OF THE "ZAMBRÓW" PHOTOVOLTAIC PARK INCLUDING DEVICES

6.1. Facilities and devices of photovoltaic systems.

The "Zambrów" photovoltaic park with a total capacity of up to 12 MW, planned in Zambrów, will produce electricity from solar energy through the process of converting solar energy to electricity.

The commissioning of the "Zambrów" photovoltaic park requires the construction of several technologically related facilities, which include:

Option 1 – 12 photovoltaic power plants with a capacity of up to 1 MW each:

1. Table structures for photovoltaic modules with an area up to 2 m^2 (depending on the number and size of tables for photovoltaic panels);
2. Photovoltaic panels – the number of photovoltaic panels will depend on the panel capacity used at the stage of the building permit/detailed design, but the installed capacity cannot exceed 1 MW (for example, for a 280 W panel the number of panels is 3,570 pcs = 999.6 kW);
3. Inverters – devices converting direct current to alternating current in the amount appropriately selected at the stage of the building permit design together with cable systems;
4. Container transformer station with all equipment (capacity and area depending on the method of connection to the power grid);
5. Overhead or cable power connection (depending on the conditions for connection to the power grid);
6. Mesh fence.

Option 2 – 1 photovoltaic power plant with a capacity of up to 12 MW:

1. Table structures for photovoltaic modules with an area up to 25 m^2 (depending on the number and size of tables for photovoltaic panels);
2. Photovoltaic panels – the number of photovoltaic panels will depend on the panel capacity used at the stage of the building permit/detailed design, but the installed capacity cannot exceed 1 MW (for example, for a 280 W panel the number of panels is 42856 pcs = 11999.68 kW);
3. Inverters – devices converting direct current to alternating current in the amount appropriately selected at the stage of the building permit design together with cable systems;
4. Container transformer station with all equipment (capacities and area depending on the method of connection to the power grid);
5. Overhead or cable power connections (depending on the conditions for connection to the power grid);
6. Mesh fence.

Note!

All surfaces and quantities given in the specification are examples (final parameters will be chosen at the stage of the building permit design).

In the area of the plot it is not planned to execute a hardstanding and equip the area with the following networks: sanitary sewerage and rain water drainage, district heating, water supply and gas.

6.2. Planned development area specification.

Table No. 2. Specification of plot area used:

For option 1 – 12 power plants with a capacity of up to 1 MW each (sample summary table of the photovoltaic farm area specification for 280 W panels):

GROSS COVERED AREA	
Item 1 Area planned for investment purposes (23.37 ha/12 farms with a	**19 400 m^2**

capacity of up to 1 MW = approx. 1.94 ha (the exact area for each of 12 farms will be determined at the stage of the building permit design after the selection of the construction option)	
Item 2 Photovoltaic modules (top view – average value assumed for a farm of up to 1 MW)	**approx. 6,000 m^2**
Item 3 Table poles (for a farm of up to 1 MW)	**2 m^2**
Item 4 Transformer station (for a farm of up to 1 MW)	**approx. 15 m^2**
Total: excluding **item 1** and **item 2**	**approx. 17 m^2**
BIOLOGICALLY ACTIVE AREA	**99,9 %**
biologically active area under the modules Item 1- (Item 3 + Item 4)	**19 383 m^2** **(1,9383 ha)**

For option 2 – 1 power plant with a capacity of up to 12 MW each (sample table of the photovoltaic system area specification for 280 W panel):

GROSS COVERED AREA	
Item 1 Area planned for investment purposes (area for one farm with a capacity of up to 12 MW)	**233 700 m^2**
Item 2 Photovoltaic panels (top view)	**approx. 72,000 m^2**
Item 3 Table columns	**approx. 25 m^2**
Item 4 Transformer stations (assumption – up to 12 stations of 15 m^2 each)	**approx. 180 m^2**
Total: excluding **item 1** and **item 2**	**approx. 205 m^2**
BIOLOGICALLY ACTIVE AREA	**99,9%**
biologically active area under the modules Item 1- (Item 3 + Item 4)	**233 496 m^2** **(23,3496 ha)**

Conceptual land development plan (Appendix No. 1)

Sample data sheet for photovoltaic panels with dimensions (Appendix No. 7)

Sample data sheet for inverters with dimensions (Appendix No. 8)

Sample transformer station (Appendix No. 9)

7. TYPE OF TECHNOLOGY PROPOSED

7.1. Description of the technology.

"Zambrów" photovoltaic park with a total capacity of up to 12 MW will be made of photovoltaic panels (polycrystalline, monocrystalline), which will be installed on the so-called "support structure tables" at an angle of approx. 20°–35° in the south direction or at an angle of approx. 15° for the east-west direction. The "Zambrów" photovoltaic park planned for construction will not be equipped with an automatic tracking module.

The number of tables for photovoltaic panels will depend on the capacity of the panels. In the case of installation of 280 W photovoltaic panels (approx. 3,570 pcs for a single farm of up to 1 MW; approx. 42,856 pcs for a farm of up to 12 MW), the power plant will be built from the so-called "tables" in the amount selected at the design stage taking into account, among others, the existing shading. The distance between individual tables is approx. 20 cm and the distance between rows is from 1 to 8 m, depending on the type of construction and the possibility of shading. If, at the stage of the building permit/detailed design, the investor decides to change, i.e. to increase the capacity of the photovoltaic

panel for example to 290 W, the number of tables and rows will be reduced due to the reduction of the number of photovoltaic panels.

Connection of photovoltaic power plants to the power grid in both options 1 and 2 will be possible by means of transformer stations, whose capacities and precise parameters will be selected at the stage of the building permit/detailed design. The voltage on the primary winding will be within 16.1 – 16.5 kV and on the secondary winding will be 0.4 kV. Oil-filled transformers will be used with an installed oil bund that holds 100% of the transformer oil, which indicates that the groundwater environment is protected.

The planned "Zambrów" photovoltaic park will be connected to the existing Main Power Supply Point located approx. 1 km to the north of the plot in question by means of MV-15 kV switching station (RSN-15 kV – number of switching stations at the design stage). The exact location of the RSN-15 kV switching station will be shown at the design stage as agreed with the Distribution Network Operator. It is possible to separate the area intended for the construction of RSN-15 kV from the plot of land No. 1910/11.

The main advantages of photovoltaic systems are that they are reliable, lightweight and can produce free, grid-tied electricity in a clean, quiet and virtually maintenance-free manner.

The efficiency of the system depends primarily on the insolation obtained annually at the installation site of the photovoltaic power plant.

The greater the number of sunny days and the stronger the radiation, the more electricity we are able to obtain from a given photovoltaic power plant.

Electricity production using photovoltaic modules is done with a relatively high efficiency of 13–15%. This relatively high efficiency is due to the fact that solar radiation energy is converted to electricity without heat.

7.2. Process description.

Photovoltaic panels (in other words: solar cells or photocells) are used to convert solar energy to electricity, and the conversion process is called photovoltaic conversion. A photovoltaic cell is a siliceous wafer inside of which a potential barrier (electric field) exists, in the form of a p-n (positive – negative) junction. Solar radiation falling on the photocell knocks electrons out of their places in the semiconductor structure, creating pairs of carriers with opposite charges (an electron with a negative charge and a positively charged "hole" created when the electron is knocked out). These charges are then separated by the electric field existing at the p-n junction, causing a voltage to appear in the cell. Simply connect an energy-consuming device to the cell and electricity flows. Photovoltaic cells are most often made of silicon, the second most common element on Earth after oxygen, which is found, e.g., in sand.

7.3. Mechanical characteristics of photovoltaic panels.

A photovoltaic module is placed in an anodized aluminum alloy frame with dimensions depending on the manufacturer and panel power rating. For example, a 280 W photovoltaic panel from Q-CELLS has dimensions of 1640x1000x32 [mm]. The photovoltaic module consists of 60 cells with dimensions of 60x100 mm, placed on 3.2 mm thermally stressed glass with anti-reflection technology. To ensure encapsulation, the module undergoes resin lamination using the EVA method. The panel prepared in this way is characterized by IP67 protection rating.

The specified photovoltaic panel is provided with an anti-reflective coating.

7.4. Operating conditions of photovoltaic panels.

The photovoltaic panel is adapted to operate in temperatures from -40 C to 85 C. It features resistance to 25 mm diameter hail impact at the speed of 23 m/s. The dead load (e.g. snow load) is max. 5400 Pa. In terms of fire safety, it is classified to Class A fire safety.

7.5. Photovoltaic system operation technology, cooling description.

At the stage of construction and operation of the photovoltaic system including photovoltaic panels,

no cooling systems are foreseen due to the fact that the energy of solar radiation is converted into electrical energy without the participation of heat.

7.6. Safety system

The entire technological process taking place in the photovoltaic system will be automatically controlled, and all operating parameters of the system will be monitored.

In case of maintenance work on photovoltaic panels or failure of tables with photovoltaic modules, the system is able to manually and automatically disconnect selected circuits.

8. POSSIBLE OPTIONS OF THE PROJECT

The following factors were considered when selecting a photovoltaic power plant site:

- convenient transportation;
- proximity of Zambrów Main Power Supply Point to the plot of land covered by the study, which enables introduction of a specific power into the distribution network;

Various locations for the siting of photovoltaic power plants were considered during the option selection process, but were limited to the study parcel. The direct reason for such decision is an adequate surface area of the plot of land allowing for construction of "Zambrów" photovoltaic park with a total capacity of up to 12 MW and proximity of Zambrów Main Power Supply Point, which enables direct connection of photovoltaic power plants constituting photovoltaic park to the power grid. The choice of such location will result in minimization of interference in the natural environment, as the area where the photovoltaic power plants are located is an agricultural area, and there are no forests, watercourses, drainage ditches etc. there. The cable route of MV-15 kV service lines will run along the subject plot of land No. 1910/11 to RSN-15 kV (location of RSN-15kV at the design stage), and thus along agricultural land.

Other plots were also taken into consideration when choosing the location, however, they were not selected because they were small plots located at quite large distances from each other and it would not be possible to build a photovoltaic park with a total capacity of up to 12 MW.

The indicated location of "Zambrów" photovoltaic park with a total capacity of up to 12 MW on the plot of land no. 1910/11 in the town of Zambrów was found to be the most advantageous and it is the option proposed by the applicant as the most rational in economic terms.

8.1. Description of options analyzed.

Option I – Decision to abandon the project.

Option one would be to take no actions related to the construction of the investment project. The area intended for the investment project will be left undeveloped.

The abandonment of the construction of a photovoltaic park and thus the acquisition of electricity from a renewable energy source using the energy of the sun will cause increased air pollution.

Conventional power plants will, as before, primarily use coal to generate electricity, which causes emissions of carbon dioxide and other chemical compounds and consequently contributes to global climate warming.

No actions taken to increase energy generation from RES will exacerbate the greenhouse effect and associated negative environmental impacts.

The construction of photovoltaic power plants will cause reduction of conventional power generation.

Option one means abandoning efforts to generate electricity from renewable sources. Abandonment of the investment project implementation will limit the possibility of meeting the objectives assumed in governmental and EU programs.

Option II – construction of "Zambrów" photovoltaic park with a total capacity of up to 12 MW in

Zambrów.

The investor has chosen to implement option II. This option involves the construction of "Zambrów" photovoltaic park with a total capacity of up to 12 MW on a plot of land no. 1910/11 in the town of Zambrów, using the technology described in point 7, assuming construction and installation of photovoltaic panels, which together with other devices convert solar energy into electricity.

Reasons for selecting Option II:

- convenient investment project location, appropriate plot size and possibility to connect the photovoltaic park to the power grid;
- the main purpose of building "Zambrów" photovoltaic park is not the additional electricity generation but reduction of flue gas emission from stacks of coal power plants.

To produce 1 MWh of electricity, conventional power plants mainly use coal which results in emissions to the atmosphere of: CO_2, CO, SO_2, NOx, and particulate matter.

Every megawatt hour of clean electricity from a renewable source will reduce the emission of flue gas harmful to health and environmentally toxic that accompany conventional power generation.

In addition, the implementation of the planned investment project in the proposed option will contribute to the achievement of the objectives contained in Directive 2001/77/EC of September 27, 2001 on the promotion of electricity produced from renewable energy sources in the internal market, which includes, among others, the following objectives and formulations:

- the Community recognizes the need to promote renewable sources of electricity as a priority;
- support for utilization of renewable energy sources should be consistent with other Community objectives, in particular those related to the use of solar energy;
- assignment of "indicative" RES energy share indicators for each member country;
- the obligation to ensure priority of access to the grid for energy generated from RES and to establish network services standards for RES generators is imposed by Directive 2003/54/EC,
- introducing the obligation to facilitate administrative procedures of RES location and construction for potential investors.

Most environment-friendly option.

Taking into account all environmental problems that photovoltaic system (solar power plant) solves, related to the necessity of significant increase in renewable energy production on a national scale (EU requirement) and the environmental impact of these solutions, the most beneficial option is building "Zambrów" photovoltaic park with a total capacity of up to 12 MW. The most environment-friendly option means undertaking an investment project that meets all applicable environmental and sustainable development regulations and standards.

Construction of the photovoltaic park under the proposed option will result in the following environmental benefits:

- the electricity generation from a renewable energy source, which indirectly contributes to reducing the emission of harmful substances into the atmosphere generated during the production of electricity from conventional energy sources;
- reduction of CO_2 emission by generating energy without burning fossil fuels;
- rational and efficient use of the solar energy to produce renewable energy.

Failure to implement the planned investment project will have negative effects on human living conditions and the environment in the long run:

- opportunities will not be created for the clean and efficient use of solar energy,
- carbon dioxide emission into the atmosphere will not be reduced.

The information presented in the Project Information Sheet (PIS) indicates that the proposed option II would be the most environmental-friendly one. Construction of "Zambrów" photovoltaic park with a total capacity of up to 12 MW in the town of Zambrów on the plot of land no. 1910/11 will bring notable environmental and economic benefits and will not cause nuisance to the environment.

9. ANTICIPATED DEMAND FOR WATER, RAW MATERIALS, MATERIALS, FUELS AND ENERGY

The planned photovoltaic park will produce electric power. The production volume will be:

- **System of up to 1 MW each – about 1100 MWh/year each.**
- **System of up to 12 MW – about 13 000 MWh/year.**

Energy will be produced by converting the solar energy into electricity. The photovoltaic park does not need water supply, sewage system, gas or heat supply to function. Each of the planned transformer stations will need about 10 MWh of electricity drawn from the grid annually for monitoring and control purposes only. Number of stations depending on the selected option, at the design stage.

10. ENVIRONMENTAL PROTECTION SOLUTIONS

Works associated with implementation and operation of the investment project consisting in construction of "Zambrów" photovoltaic park will not have a noticeable negative impact on the natural environment.

No earthworks permanently deforming the terrain relief are expected (the technology of placing special tables does not require foundations or excavations). Shallow driving of table legs is allowed and the materials used will not pollute the environment. Shall minor earthwork be necessary, the terrain relief will be restored to its original condition.

The project site is located in an agricultural landscape in close proximity to rural development. The avifauna occurring in these areas is typical of open fields and neighborhood of rural development. The main species of birds breeding in such areas are: skylark *Alauda arvensis*, yellow wagtail *Motacilla flava*, white wagtail *Motacilla alba*, partridge *Pedrix pedrix*, and tree sparrow *Passer montanus*.

These are common species. They do not include endangered species, species listed in the Red Data Book of Animals or species included in Appendix I of the directive 2009/147/EC of November 30, 2009 on the conservation of wild birds (so called Birds Directive).

Implementation of the investment project, while maintaining the biologically active area, should not affect the decrease of their number in this area. The project site will continue to be able to serve as a feeding or breeding ground. Other animal groups found in this type of landscape are amphibians and reptiles. Amphibians in this type of environment are represented by the common toad *Bufo bufo* and reptiles by the sand lizard *Lacerna agilis*. Both amphibians and reptiles are protected.

On the plot intended for the investment project, there is no water body, which can be a breeding ground for amphibians. Thus, there is no threat of destruction of amphibian breeding sites and movement corridors for species associated with wetland habitats.

Preservation of biologically active area in the project site and the use of fencing (mesh, no high fencing base of over 10 cm) will prevent the project site from becoming a barrier to the above-mentioned small animals. It can still provide potential foraging habitat for amphibians, reptiles, and breeding and foraging habitat for common farmland birds.

The following solutions will be adopted to further minimize the environmental impact of the project:

- the photovoltaic power plants will be operated in accordance with the guidelines set forth in the operating instructions for the facilities, which will specify the procedures to be followed during operation and in case of emergency.

Currently, all components offered in photovoltaic power plants are manufactured in accordance with European or Polish standards and have CE, B certificates allowing them to be used in Poland.

The area of the planned "Zambrów" photovoltaic park, i.e. on the plot of land No. 1910/11 in Zambrów, is composed of the following agricultural land classes:

- AGRICULTURAL LAND CLASS RIVa – 13.54 ha of the total investment project site area;
- AGRICULTURAL LAND CLASS RIVb – 8.73 ha of the total investment project site area;

- AGRICULTURAL LAND CLASS RV – 1.04 ha of the total investment project site area;
- AGRICULTURAL LAND CLASS N – 0.06 ha of the total investment project site area;

A map with the marked areas and their agricultural land classes for the photovoltaic park is shown in Appendix 10.

11. TYPES AND ESTIMATED AMOUNT OF SUBSTANCES OR ENERGY RELEASED INTO THE ENVIRONMENT USING THE SOLUTIONS AIMED TO PROTECT THE ENVIRONMENT

11.1. The usefulness of building renewable energy sources.

One of the main hazards of civilization is the constantly increasing worldwide emission of pollutants into the atmosphere in the form of gases and dust. The main culprit responsible for this situation is the energy sector.

For Poland, the annual emissions of the energy sector are:

- CO_2 – 170 million tonnes
- SO_2 – 1.4 million tonnes
- NOx – 0.6 million tonnes
- Dust – 10 million tonnes

European Union member states have decided to actively participate in the radical reduction of pollution levels by equating these emissions to climate change on Earth. Poland has committed to reduce pollution levels by 20% by 2020. These commitments must be met only through intensive development of renewable energy sources including photovoltaic plants. Thus, development of these types of sources is a viable way to reduce air emissions.

When a renewable energy source (RES) is put into operation, it automatically reduces the power generation in the conventional power system, thereby simultaneously reducing pollutants (gases and dust) emitted by that system.

One of such sources reducing emission is the planned "Zambrów" photovoltaic park with a total capacity of up to 12 MW in Zambrów.

11.2. Air emission

a) *implementation stage:*

At the investment project implementation stage there will be an increase in the emission of pollutants into the air. The pollutants introduced will be associated with vehicle traffic and the operation of construction machinery. These impacts will be of local and limited nature. The relatively short construction period and the low intensity of vehicle traffic will not result in long-term adverse impacts to the surrounding area. Construction materials will be delivered by trucks during construction of the facility. Fuel combustion by vehicles will be a source of pollutant emissions to the atmospheric air. These will include nitrogen dioxide, carbon monoxide, dust, aromatic hydrocarbons and aliphatic hydrocarbons.

It is particularly important for the protection of atmospheric air during the construction phase that the works are properly organized. Reduction of pollutant emissions by minimizing flue gas emission can also be achieved by turning off the engines of construction equipment and vehicles transporting construction materials during stoppage or loading, and keeping engines in good working condition.

b) *operation stage:*

During the operation of the photovoltaic park, there will be no sources of air emissions characteristic for conventional power generation.

However, once photovoltaic panels have reached the end of their useful life, the panel manufacturer undertakes to recycle the modules in all EU member countries through the specialist company PV CYCLE.

The area under the panels (weeds, grass) will be mowed with a rotary mower and trimmers. No chemicals will be used to slow the growth of grasses and plants. The photovoltaic panels will be washed with water using a pressure washer and brush without any chemicals. Water for panel washing will be delivered by a water cart.

11.3. Noise emission.

a) implementation stage:

Noise impact that will occur during construction of the PV plant facilities will be associated with site preparation and the entire infrastructure. The acoustic climate will be shaped mainly by operating construction machinery and equipment and means of transport delivering construction materials, e.g. dump trucks. Process vehicles as well as means of transport are noise sources with noise levels of 88 – 95 dB. However, it should be noted that they will only work during construction period.

Thus, during the implementation of the investment project there will be noise emission which will cease upon completion of the works and will not pose a threat to the acoustic climate in the area.

b) operation stage:

Pursuant to the ordinance of the Minister of Environment of June 14, 2007 on admissible levels of noise in the environment (Journal of Laws of 2007 No. 120, item 826) the area allocated to the investment project is not subject to acoustic protection.

The environment is as follows:

- from the north – an internal road being an access road to the planned photovoltaic park and agricultural areas;
- from the south – areas constituting allotment gardens;
- from the west – a public road (voivodship road), residential areas, agricultural areas;
- from the east – agricultural areas.

A noise-sensitive area is an area for which a permissible noise level has been established.

The permissible levels of environmental noise emitted by individual groups of noise sources in the noise-sensitive area are specified in Table 3 of the Appendix to the aforementioned ordinance.

Table 3. Permissible noise sources.

Item	Type of area	Permissible noise level in [dB]			
		Roads or railroads		Other facilities and activity being the noise source	
		LAeq D – reference time interval equal to 16 hours	**LAeq N** – reference time interval equal to 8 hours	**LAeq D** – reference time interval equal to 8 the least favorable consecutive hours during the day	**LAeq N** – reference time interval equal to 1 the least favorable hour in the night
1	a) Resort protective zone "A" b) Hospital grounds outside of urban areas	50	45	45	40
2	a) Single-family residential areas b) Residential areas associated with permanent or temporary presence	55	50	50	40

	of children and youth c) Areas where social care houses are located d) Hospital areas in towns				
3	a) Multi-family and boarding house residential areas b) Farmstead areas c) Recreational and rest areas d) Residential and service areas	60	50	55	45
4	Downtown areas in cities with population of 100 thousands or more	65	55	55	45

The permissible noise levels for homestead development areas are:

55 dB for daytime (6 a.m. – 10 p.m.),

45 dB for nighttime (10 p.m. – 6 a.m.)

11.4. Actions aimed to prevent or reduce acoustic nuisance.

No noise will be emitted during the use-and-operation phase of the photovoltaic park. Therefore, it will not adversely affect neighboring areas in the immediate vicinity and further away from the investment project site.

11.5. Wastewater management.

During both the construction and operation phases, small amounts of social and domestic wastewater may be generated in the portable (TOI-TOI) toilet. The wastewater will be directly discharged into a septic tank and then transported by a septic tanker to a wastewater treatment plant.

11.6. Rain and thaw water.

"Zambrów" photovoltaic park will not have paved yards. Rainwater from photovoltaic panels will be discharged to the surface of the ground. The ground will be their only receiver in this case. The method of water discharge directly into the ground is the most beneficial from the point of view of the balance of the natural water cycle in nature.

In accordance with § 19 section 2 of the Ordinance of the Minister of the Environment of July 24, 2006 on conditions to be met when discharging wastewater into the water or ground, and on substances particularly harmful for the water environment (Journal of Laws No. 137, item 984 as amended) rain water and thaw water originating from surfaces other than those listed in section 1, i.e. not collected into impervious open or closed drainage systems and not coming from contaminated impervious surface of industrial areas may be discharged into waters or the ground without treatment.

Based on data from studies of the Institute of Environmental Protection, Warsaw 2004 – on the quality of rain water and thaw water discharged from roof surfaces, it can be concluded that the pollution values do not exceed those corresponding to rainwater.

11.7. Waste management.

The analysis of waste management was performed on the basis of current legal regulations,

mainly the Act of December 14, 2012 (Journal of Laws of 2013, item 21). This act imposes legal technological and organizational obligations on business entities as regards waste management. There are two phases for the planned investment project: Investment project implementation stage and operation stage:

a) Investment project implementation stage:

30 days before the commencement of work, the contractor of construction works should submit, in accordance with Article 24 section 1 of the quoted waste act, information on waste generated and ways of managing it. The contractor should ensure proper management of waste generated in accordance with the Act on Maintaining Cleanliness and Tidiness in Communes of September 13, 1996. (Journal of Laws of 2005, No. 236, item 2008, as amended) At the stage of the investment project implementation waste will be generated due to construction works, use of construction equipment and functioning of the back-up facilities.

Waste used at the investment project implementation stage and operation stage are given in the table below in accordance with the Regulation of the Minister of Environment of December 9, 2014 on the catalog of waste (Journal of Laws of 2014, item 1923).

IMPLEMENTATION STAGE:

Item	Waste code	Waste type	Approximate quantity [Mg]
1	12 01 02	Particular matter and dust of iron and its alloys	0.96
2	15 01 01	Paper and cardboard packaging	0.96
3	15 01 02	Plastic packages	0.96
4	15 01 04	Metal packages	0.96
5	17 01 01	Concrete waste and concrete debris from demolitions and overhauls	13.44
6	17 01 82	Other unspecified construction waste	0.096
7	17 04 05	Iron and steel	21.6
8	17 04 11	Cables other than those referred to in 17 04 10	2.64
9	17 05 04	Soil and earth including stones, other than those referred to in 17 05 03	19.92
10	19 10 02	Non-ferrous metal waste	0.096
11	20 01 39	Plastic materials	0.96
12	20 03 04	Sludges from septic tanks used to collect liquid wastes	0.96
13	17 04 02	Aluminum	18
TOTAL			**81.552**

Waste generated during the implementation stage will be managed by authorized waste collection companies. The plastics will be handed over to a company holding a construction waste management permit for use, recovery, or disposal in an inert waste landfill. The remaining waste is on the list of waste that can be handed over to individual waste collection companies to be used, for example, for minor repairs. Waste will be transported mainly by recipients' vehicles or by contracting the service to a company holding a waste transport permit. According to the Waste Act, the generator may also transport the waste itself to the collection points. During the assembly works, waste will be stored on the construction site in places especially designated for that purpose, in a manner not interfering with the conducted works and meeting OH&S requirements. Waste will be stored selectively by code type and size assortment in containers of waste collection companies or in orderly stockpiles. Before the commissioning of the power plant, all waste will be transferred and the site will be finally cleaned up.

b) Investment project operation stage:

No solid waste will be generated during the operation stage as it will be an unmanned facility.

12. POSSIBLE CROSS-BORDER ENVIRONMENTAL IMPACT

A cross-border impact may occur in the case of investment projects located at such a distance from the national border that the range of their impact exceeds this border. This may be primarily the landscape impact, but also noise, air, or flora and fauna impacts.

The planned "Zambrów" photovoltaic park with a total capacity of up to 12 MW in the town of Zambrów will be located far from the national borders (the nearest border is the Polish-Belarusian border located about 100 km away from the investment project site), therefore there is no possibility of trans-border environmental impact of this investment project.

The operation of the photovoltaic park as a renewable energy source shall contribute to the reduction of greenhouse gas emissions.

13. LOCATION OF THE PHOTOVOLTAIC PARK in relation to the Homogeneous Surface Water Bodies (JCWP) and Homogeneous Groundwater Bodies (JCWPd).

The project will be implemented in the Middle Vistula River water region in the area of the Homogeneous Groundwater Body (JCWPd 51), with the EU code PLGW200051, and in the area of the Homogeneous Surface Water Body (JCWP) with the code RW200017263429. The designed "Zambrów" photovoltaic park will not have a negative impact on the environmental objectives included in the water management plan for the river basin, for which the water management plan for the Vistula River basin has been approved.

At the implementation and operation stage, the project will not have a negative impact on climate change and the project impact on climate change and the impact of climate and its changes.

The operation of the photovoltaic park will contribute to the reduction of carbon dioxide emissions.

The location of the photovoltaic park in relation to the Homogeneous Groundwater Bodies is shown in Appendix **No. 11A**, while the location of the project in relation to the Homogeneous Surface Water Bodies is shown in Appendix **No. 11B**.

In the immediate vicinity of the planned photovoltaic park with a total capacity of up to 12 MW there are no areas with shallow presence of groundwater, water intake protection zones, inland water reservoir protection areas, health resorts and health resort protection areas, areas where environmental quality standards have been exceeded and areas with landscape of historical, cultural and archaeological significance;

No local animal migration corridors run through the project site or in its immediate vicinity.

14. AREAS SUBJECT TO PROTECTION UNDER THE ACT ON NATURE CONSERVATION OF APRIL 16, 2004, LOCATED WITHIN THE RANGE OF A SIGNIFICANT IMPACT OF THE PROJECT

In accordance with the provisions of the Act of April 16, 2004 on nature conservation, the forms of nature conservation are: national parks, nature reserves, landscape parks, Natura 2000 sites, protected landscape areas, ecological areas, natural landscape complexes.

14.1. Environmental impact:

The area planned for the construction of the "Zambrów" photovoltaic park is not located within protected areas.

The area intended for the project is located approx. **11.2** km from the **Łomża Landscape Park of Narew River Valley** – **the buffer zone** – the buffer zone area amounts to 12,228.58 ha. It is located at the interface of two Regions: Mazowiecko-Podlaska Region and Mazursko-Podlaska Region. The Narew River flowing through the Park separates the Wysoczyzna Kolneńska upland from the Wysoczyzna Wysokomazowiecka upland.

The Łomża Landscape Park of the Narew River Valley in Drozdowo is located in the Podlaskie Voivodeship, approx. 70 km west of Białystok, and its western border adjoins the city of Łomża. The park was created by virtue of the regulation of the Łomża Voivodeship Governor in December 1994.

The idea of its establishment was to preserve, almost intact, the Narew River valley with valuable communities of water, thicket, peat and meadow greenery, and small fragments of riparian forests and protection of unique, exceptionally interesting topography of this area developed as a result of the Narew River running through the Wysoczyzna Kolneńska upland and Wysoczyzna Wysokomazowiecka

upland. At this point, the Narew River, at a section of several hundred kilometers of its course, forms a gorge through glacial elevations with the edge zone whose wavy slopes elevate at approx. 40-50 m. This section is also referred to as the Ravine Valley of the Narew River.

The central part, which is the axis of the Park, is a 16-kilometer section of the river, located between the mouth of the Łojewek River (101 m a.s.l.) and the bridge connecting Łomża with Piątnica (99 m a.s.l.).

Downstream from Pniewo (left bank) and Rakowo Boginie (right bank), for approx. 10 km there is a "real" river gorge. "Carved" in glacial elevations, the plain valley is 3 to 1.5 km wide. When we stand on one of the hills, we will see a unique view of the meandering, unregulated Narew River and numerous long lakes-old river beds formed after changes in the course of the river. Changes in the river bed made it difficult for residents of some villages to access their meadows and pastures. After the change in the river course, these areas were suddenly found on the other side of the Narew River. Therefore, a lot of ferries met in this area (Rakowo, Krzewo, Bronowo). The development of the villages visible from above are characterized by elongated buildings located along the Narew River and occupy the lower part of the valley edge zone.

In the periods of regular spring, the river disappears and the water flowing from spring snowmelt form a huge floodplain-lake, limited with the valley width. Only here and there, trees and taller bushes protruding from the water allow for locating the Narew riverbed. An additional attraction of this time of the year is the "noise" and the sight of huge amounts of wild birds resting here, returning to their breeding sites.

Diverse topography, different degree of terrain moisture, cause that there is a rich vegetation and numerous animal species. The current knowledge about the Park flora and fauna, based on survey and monitoring works, allows for classifying this area as one of the most valuable in terms of nature, not only in the region, but also in the country.

The area of the planned project is located approx. **3.97** km from the **"Grabówka" Reserve** – a nature reserve situated in the Zambrów Municipality in Podlaskie Voivodeship. The area of the reserve is 60.87 ha (according to the foundation act – 60.80 ha).

This is an area of forest in the central part of the Grabówka-Wierzbowo nature reserve, located approx. 4 km east of Zambrów, south of the Zambrów-Wierzbowo road. The reserve includes a Nature Trail that runs along the western wall of the reserve along the road separating the protected area from the rest of the forest. At the end of its route, an old, abandoned forester's house is located.

The reserve was created to protect a multi-species deciduous forest with a high degree of naturalness. The reserve is dominated by 70 years old hornbeam and a stunning pedunculate oak. In the northern part of the complex there are many old oaks over a hundred years old, as well as aspens, silver birches and lindens. Layers of bushes are formed by the rowan trees, linden, hazel, common hawthorn, guelder rose, buckthorn. The herb layer is dominated by the wood anemone in spring, and by the greater stitchwort, asarabacca, Ranunculus cassubicus, early dog-violet and bird's-nest orchid in summer.

Historically, the reserve is located in the area of the former Puszcza Łętowo forest, colonized by the Mazovian princes, and subsequently in the forest referred to as Puszcza Czerwona. This was the property of Wola Zambrowska, which belonged to the Łomża economy and administratively to the Łomża Forest Administration Region. In 1920, the Grabówka nature reserve was nationalized and belonged to the Zambrów State Forest District established after 1918. By virtue of the regulation of the Minister of Environmental Protection, Natural Resources and Forestry of November 12, 1996, the "Grabówka" nature reserve was established in this area.

14.2. Impact on NATURA 2000 site:

At a distance of approx. **8.1** km from the site where the "Zambrów" photovoltaic park with a total capacity of up to 12 MW is planned, the **"Czerwony Bór" Natura 2000** site is located.

Area code:

PLH200018

Area:

5052.22 ha

Characteristics of the area:

Czerwony Bór forest is located in north-eastern Poland, in the western part of Podlaskie Voivodeship, in Zambrów District, in Zambrów Municipality. It extends south of Łomża and west of Zambrów. The area of Czerwony Bór forest is located within the Łomża Forest District, Zambrów II cadastral district, Czerwony Bór and Tabędz Forest Administration Regions. The specificity of forests in this area is formed mainly by pine tree stands growing on moraine hills and dunes extending longitudinally. It includes the remnants of forests originally referred to as Puszcza Czerwona forest, whose name appears in documents dated 1503-1505. The name of this area is associated with the occurrence of larch (with brown-red bark), which formerly was the dominant species here (the so-called Zambrów larch forests, later referred to as the Czerwony Bór forest). During the Prussian administration, almost the entire area of these forests was cut down and cleared, so that at the beginning of the 19th century the entire Czerwony Bór forest area was a wilderness covered with grass and dwarf pine. In 1845, the development plan for Czerwony Bór forest was approved, and afforestation by seeding was completed in 1859. At that time, forest management was carried out by clear-cutting (Forest Holding Management Plans for the Łomża Forest District 2005-2015). In the years 1860-1874, afforestation of the area of Czerwony Bór forest was supervised by Wojciech Jastrzębowski (1799-1882), an outstanding botanist, professor of the Agricultural and Forestry Institute in Marymont and founder of the Department of Practice Forestry in Feliksów near Brok upon the Bug river (Kowalska 1976).

The next stage of devastation of the Czerwony Bór forest tree stand took place during the First World War, and the next, in the years 1923-1926, when the pine monocultures of the area suffered a catastrophic gradation of the pine beauty destroying the entire tree stand, which in effect was completely removed. After the forest was cleared, the area was taken over by the military, creating a military training ground. The Łomża Forest District reactivated in 1945 covered by its administration the tree stands of the Czerwony Bór nature reserve devastated after World War II. Mainly pine was used for artificial regeneration of the forest (Forest Holding Management Plans for the Łomża Forest District 2005-2015). On the basis of the 3rd revision of forest management for the years 2000-2009, the entire Czerwony Bór forest was classified as a protective forest of special importance for national defense and security. Subsequently, in the years 2001-2002, the military training ground was removed and its area was handed over to the Łomża Forest District. Out of the total area of Zambrów II Cadastral District – 6848.1805 ha – which includes the Czerwony Bór forest area, forest land is 64.42% and non-forest land is 37.58%. Among forest lands, protective forests cover 58.3 ha (1.4% in the category of water-protecting forests), and cultivated forests cover 3984.03 ha (98.6%). Mixed fresh coniferous forest is the dominant habitat type (52.3%), dominated by the pine Pinus sylvestris (59.03%) and admixture of the birch Betula pendula (39.5%). In terms of occupied area, fresh pine forest is another habitat type (39.8%), also dominated by pine (95.6%). Dry forest, on the other hand, is only 0.8% of the total area of the district. A small area is also occupied by patches of mixed fresh forests (4.2%) and fresh forests (0.2%), or wet habitats – coniferous forest (0.6%) and forest (0.7%). The species composition of mixed fresh forests comprises mainly the birch Betula pendula (42.7%) and the pine Pinus sylvestris (31.9%), with a smaller share of larch Larix decidua (11.0%) and the oak Quercus robur (11.6%). However, oak is the main forest-forming species of tree stands on fresh forest habitats. The Czerwony Bór forest area is dominated by proper rusty soils (80.4%), podsolic and rusty soils (8.5%) and brown and rusty soils (6.7%), while the share of other soil subtypes (leached brown soils, peaty lowland peat bogs, muck and mineral soils) does not exceed 0.1-0.7%.

Surface formations are dominated by sands (86.5%) and gravelly sands and gravels (9.2%), while the share of other formations (loamy sands, sands on dusty formations and dusts, peats on sands, muck on peats) ranges from 0.1 to 1.7% (Forest Holding Management Plans for the Łomża Forest District 2005-2015).

Quality and significance:

Czerwony Bór forest is an important refuge for oligo- and mesotrophic Natura 2000 habitats occurring on mineral soils – grasslands, heaths and junipers, insufficiently protected on a national scale, especially in the refuges of north-eastern Poland. The most valuable fragments of Czerwony Bór forest are the juniper Juniperus communis (5130) brushes, occurring in a mosaic with heaths (4030) and various types of grasslands. Junipers can be found in the form of large patches often covering entire

forest units, but also in small gaps in tree stands or in forest edges. They are located primarily in the north-western, central, and south-western parts of the site in the area of the former military training ground. In the poorest sand, dune habitats, juniper brushes are stable and continuous. Where the soil is more fertile and slightly more wet, birch, pine and aspen enter the shrubs in the process of secondary succession, which results in gradual meeting of trees along the rows, shading the soil surface and dying out of the juniper. Much of the juniper brushes have been destroyed in recent years in areas prepared for large-scale afforestation.

Small patches of dry heaths Calluno-Arctostaphylion (4030-3) as well as xeric sand calcareous grasslands Koelerion glaucae (6120-1) and inland dunes with corynephorus grasslands Spergulo-Corynophoretum (2330-1) occur in the complex with juniper formations. Dry heaths occur as treeless prostrate shrub communities with the heather Calluna vulgaris dominating and with a rich flora of mosses and lichens. They are low and colorful communities, also located primarily in the north-western, central, and south-western parts of the site in the area of the former military training ground. The natural values of the listed non-forest habitats in the analyzed area are high and the representativeness is excellent. This is in no way diminished by their species poverty – on the contrary, a sparse set of vascular plants characterizes the best-established patches of grasslands, heaths and junipers, and an increase in species composition is one of the signs of their degeneration. Patches of heaths and grasslands are often accompanied by brushes of the common broom Sarothamnus scoparius, which is here, as everywhere in the Podlaskie Voivodeship, a geographically alien species and due to its expansiveness and eutrophication of habitats plays a very unfavorable role. On more fertile soils on moraine hills there are some remnants of xerothermic grasslands with the timothy Boehmera Phleum phleoides, whose species composition is extremely impoverished. Other habitats of significant natural value, but covering much smaller areas in the Czerwony Bór forest include fresh (and wet) meadows used extensively (6510), subcontinental broadleaved forests Tilio-Carpinetum and Melitti-Carpinetum (9170-2), inland forests Cladonio-Pinetum (91T0-1) and thermophilous oak forests Potentillo albae-Quercetum (91I0-1). The flora composition of species distinguishing individual habitat types is well represented in the said plant communities. Less typical are communities of lowland ash and alder riparian forest Fraxino-Alnetum (91E0-3), with tree stands dominated by the black alder Alnus glutinosa. The most valuable forest habitats in the Czerwony Bór forest area are the thermophilous oak forests Potentillo albae-Quercetum (91I0-1). The best preserved, representative patches of oak forests are protected in the Dębowe Góry reserve of 99.62 ha, located in the north, outside the main refuge area, in Podgórze Forest Administration Region. The oak communities are characterized by a high flora richness and the occurrence of numerous legally protected and endangered plant species, such as Trifolium rubens, Laserpitium prutenicum, Inula hirta and Hierochloe australis. thermophilous oak forests in the form of small patches with impoverished species composition occur also on moraine hills in the south-western part of the refuge. The oak forests are adjacent to the melliferous oak-hornbeam forests Melitti-Carpinetum, in the undergrowth of which, apart from the bastard balm Melittis melissophyllum, also the bird's-nest orchid Neottia nidus-avis and the martagon lily Lilium martagon grow. The Cladonio-Pinetum forests (91T0-1) are found sporadically in the refuge area and develop as a forest succession stage on dune hills in a complex with juniper brushes. However, large areas are occupied by degenerative forms of fresh pine forests and fresh mixed coniferous forests, characterized by very poor undergrowth, scarce ground cover and young, single-species pine tree stand.

Apart from the habitats listed in Annex I of the Habitats Directive, the sites of animal species listed in the Annexes of the EEC Council Directives – the European beaver Castor fiber (1337) – are of considerable natural value for the Czerwony Bór forest. Beaver sites are concentrated mainly in the eastern part of the Czerwony Bór forest, in close vicinity of natural river courses and their seepage spring areas (e.g. the Gać River), and communities of the lowland alder riparian forest Fraxino-Alnetum.

The Danube clouded yellow in the Czerwony Bór Natura 2000 site is likely to occur over a fairly wide area (approx. 12 km^2), if the spread of open and semi-open habitats where host plants, i.e., Chamaecytisus, are abundant, is considered. In addition, imagines in search of nectariferous plants move up to several hundred meters away from breeding habitats. In general, however, butterflies are found in small numbers and thus the species cannot be considered common. Currently, it seems most appropriate to assign the Danube clouded yellow to the rare (R) numerical category.

In Poland, a dramatic decay of the species has been observed in the last dozen years or so, and everything indicates that currently the Czerwony Bór forest is the only area of the species occurrence in Poland, apart from Puszcza Knyszyńska forest, and at the same time one of very few in Europe. The species is extremely endangered within the European Union – category CR according to the Red List of European Butterflies (Van Swaay et al. 2010).

The forest is of marginal importance for the preservation of the species both nationally and regionally.

The **"Ravine Valley of the Narew River" NATURA 2000 site** is located approx. **14.4 km** from the planned project area.

Area code:

PLC200003

Area:

7649.1 ha

Characteristics of the area:

The refuge is located in the Central Poland Lowlands, in the Kurpie region. The refuge includes a section of 16 km of the Narew River between Bronowo and Piątnica and its richly relieved edge zone. The river valley narrows on this section to approx. 1.5 to 2.0 km in width. On this section, the Narew River flows in an unregulated bed, creating numerous meanders, old river beds and branches. The largest concentration of old river beds is located between Łomża and Kalinowo. The character of the area and the rich vegetation are determined by the annual over-topping of the Narew River. The vegetation in the refuge is very diversified. There is vegetation associated with wetlands as well as extremely dry sandy and xerothermic grasslands. The specific zoning of vegetation across the valley characteristic of large natural lowland rivers is evident. In the eastern part of the area there are patches of alder forests and riparian forests. On the slopes of the valley there are thermophilous oak forests and patches of broadleaved forests. In total, 8 types of habitats valuable for the protection of European nature were found in the area. The largest area is occupied by priority riparian forests (4%), which occur, i.a., in the Wielki Dział nature reserve. The area constitutes a bird refuge of the European rank. There are 40 species of birds valuable for nature protection in Europe and 20 species included in the Polish Red Book. Particularly valuable birds breeding here are: ruff, aquatic warbler and great snipe. The area is also an important resting place for migrating birds in the spring period. More than 5,000 ruff individuals reside here during migration. In the breeding season, the area is also inhabited by the white-winged tern, black tern, common redshank and short-eared owl. In 1993, the Eurasian stone-curlew still nested in the refuge, but its nesting was not later confirmed. The waters of the Narew River are an important refuge for ichtyofauna, including 4 species valuable for nature protection in Europe: the Ukrainian brook lamprey, amur bitterling, asp and European weatherfish. A pond turtle site is also located within the refuge.

Hazards:

The main hazards to the nature in the refuge are changes in the water circulation system, development of the valley edge zone, poaching and construction of power and telecommunication lines.

Habitats:

- old river beds and natural, eutrophic water reservoirs with the Nympheion and Potamion communities,
- xeric sand calcareous grasslands (Koelerion glaucae),
- xerothermic grasslands (Festuco-Brometea and thermophilic grasslands with Asplenion septentrionalis-Festucion pallentis) * – only grasslands with significant orchid sites are prioritized,
- central European and subcontinental broadleaved forest (Galio-Carpinetum, Tilio-Carpinetum),
- alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (Salicetum albo-fragilis, Populetum albae, Alnenion glutinoso-incanae, large bittercresses),
- oak-elm-ash riparian forests (Ficario-Ulmetum),

The **"Bagno-Wizna" NATURA 2000 site** is located approx. **15.3 km** from the planned project area.

Area code:

PLB200005

Area:

14471 ha

Characteristics of the area:

The refuge area includes a large, drained low peat bog (70% of the area) developed between elevations of various sizes with mineral soils. The northern part of the refuge is occupied by the Narew River valley – one of the few natural valleys of large lowland rivers. The western part of the peat bog is flooded yearly and sedge communities have developed here; the eastern part, without floods, is overgrown with grasses with admixtures of sedges and tall perennial herbs.

The refuge includes a large low peat bog – Bagno Wizna swamp. It is the fourth, southernmost part of the Kotlina Biebrzańska basin. It is separated from the Biebrzańskie Bagna swamps by the alluvial fan of the Narew River. To the north-west the refuge adjoins the Wysoczyzna Kolneńska upland, and to the south and east the Wysoczyzna Wysokomazowiecka upland. The Bagno Wizna swamp is a vast, 10 km wide, flat and mostly strongly peaty depression with the Narew River flowing along its northern edge.

Hydrologically, the Bagno Wizna swamp is divided into two parts: the alluvial soil valley of the Narew River, shaped by river floodwaters, and the second peat bog part, which was formed under conditions of strong groundwater inflow into the basin from the surrounding uplands.

Low peat bogs cover approx. 70% of the refuge area. They were fully drained in the 1960s for agricultural purposes. Its western part is regularly flooded by the river water. Sedge communities dominate here, with tall perennial herb communities at the edges. Non-flooded peat bogs are covered mainly with grasses, locally with a larger admixture of sedges and tall perennial herbs.

Most of the open environments of the Bagno Wizna swamp is used for agricultural purposes. In the alluvial soil valley and peat bog, these are hay meadows and pastures, and on mineral elevations, these are farm fields. They are dominated by alder and birch tree stands of middle age classes. Settlements within the Bagno Wizna swamp are poorly developed. Most of the area is used for agriculture (meadows and pastures cover 90% of the area, and farm fields – 1% of the refuge). 1% is occupied by forests (alder, birch, pine and oak forests). There are 37 species of birds included in Annex I of the Birds Directive.

Hazards:

The main hazard to the area comprises the lowering of the groundwater level, intensification of farming without adapting it to birds' requirements and excessive tourist penetration (people and pets).

In addition: disposal of wastewater and landfilling of organic waste, burning vegetation, planting single-species tree stands, locating overhead power lines and associated equipment.

The idea of the Natura 2000 network is to increase the effectiveness of protection efforts by creating an additional system of protection for Europe's natural heritage. It is based on two EU directives – Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (referred to as the Birds Directive) and Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (referred to as the Habitats Directive).

The environment-friendly character of photovoltaic plants needs to be emphasized. The operation of these plants will contribute to a significant reduction in air pollution, since energy will be produced from solar energy and not from conventional sources.

The environmental impact of the planned project at both the stage of implementation and operation does not go beyond the project location. Therefore, it does not cause any impact on the areas and species protected by the Natura 2000 network.

15. LIMITED USE AREA AND PREVENTION OF INDUSTRIAL ACCIDENTS

Having analyzed the location conditions of the planned facility and having determined the impact of the project on the individual components of the environment, within the meaning of Article 248 of the Environmental Protection Law of April 27, 2001, the planned projects are not classified as plants posing a hazard of a serious industrial accident, neither are they included in the list of facilities referred to in Article 135 section 1 of the said Law, for which limited use areas may be established, as during the operation of the facility, environmental quality standards will be met.

The application of the latest technological solutions for the construction of the "Zambrów" photovoltaic park limits the occurrence of disturbances in its operation. However, despite the used protections, unforeseen situations may occur. Environmental hazards may be caused by: "pond view" and "bird feet burning."

"Pond view" is eliminated by providing construction joints between tables. The construction joint is due to the inclination angle of the photovoltaic panels used. The photovoltaic panel is placed in a metal housing made of aluminum. The panel housing is not connected to the silica cells and is not directly involved in the generation and transmission of electricity. In addition, the panel itself converts solar energy into electricity without heat. The use of aluminum for the construction of photovoltaic panels eliminates the effect of bird feet burning due to the rapid distribution of solar energy in the environment:

1) to ensure safe operation of the photovoltaic power plant, and
to minimize these hazards, the following actions are necessary: continuous monitoring and inspection of the technical condition of the equipment,
2) possibility of immediate shutdown of the equipment in case of an accident and automatic activation of safety systems,
3) training of operators in the application of health and safety rules and fire regulations,
4) having employees properly licensed for operating power equipment,
5) no access to the plant site by third parties without supervision by the photovoltaic farm personnel.

16. CONCLUSIONS

1. The subject of the document is the Information sheet for the project involving the construction of the "Zambrów" photovoltaic park (solar power plants) with a total capacity of up to 12 MW in Zambrów, Zambrów Municipality, Zambrów District, Podlaskie Voivodeship.

2. The information sheet is an appendix to the application for issuance of the decision on environmental conditions of the consent for implementation of the project.

3. The decision on environmental conditions is applied for by **GP ENERGY Sp. z o.o.** with its registered office at **ul. Ks**. **J. Popiełuszki 65A, 97-200 Tomaszów Mazowiecki**.

4. The planned photovoltaic park will be located on a **plot of land No. 1910/11 in Zambrów, Zambrów Municipality.**

5. The area of the planned project includes land of RIVa, RIVb, RV, N class. Currently, the plots are agricultural land (detailed division of land classes with their areas in the photovoltaic park area is included on page 23 of the project information sheet).

6. Grey and black water generated during the project implementation will be discharged directly into the portable (TOI-TOI) toilet tank and taken to the wastewater treatment plant by means of a septic tanker. The wastewater will be generated only in the sink and toilet.

7. The project in question is not located in a Natura 2000 protected area.

8. The environmental protection solutions presented in the information sheet are compliant with the requirements of environmental protection, provided that the operation manual for the equipment installed on the project site are complied with, that they are constantly monitored and that OH&S regulations are observed.

9. When developing the information sheet, the conditions included in Article 63 of the Act of October 3, 2008 on providing access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessment were taken into

account.

10. The prepared "project information sheet..." is the documentation necessary for the Investor to obtain the decision on environmental conditions for the planned project.

17. APPENDICES

Appendix No. 1 – Map with the location of the plot of land intended for the project along with the development concept for the "Zambrów" photovoltaic park;

Appendix No. 2 – Location of the project against protected areas;

Appendix No. 3 – Photos of the location of the planned project;

Appendix No. 4 – Map of the Study of Conditions and Directions of Spatial Development of Zambrów Municipality for the area covered by the application;

Appendix No. 5 – Photos of an example photovoltaic power plant (solar power station);

Appendix No. 6 – Land register copy;

Appendix No. 7 – Sample data sheet for photovoltaic panels;

Appendix No. 8 – Sample inverter data sheet with dimensions;

Appendix No. 9 – Sample transformer station;

Appendix No. 10 – Map with the project site proportion of land classes;

Appendix No. 11A – Location of the project against the Homogeneous Groundwater Bodies;

Appendix No. 11B – Location of the project against the Homogeneous Surface Water Bodies;

GK.6621.2027.2018

COPY OF THE CADASTRAL MAP

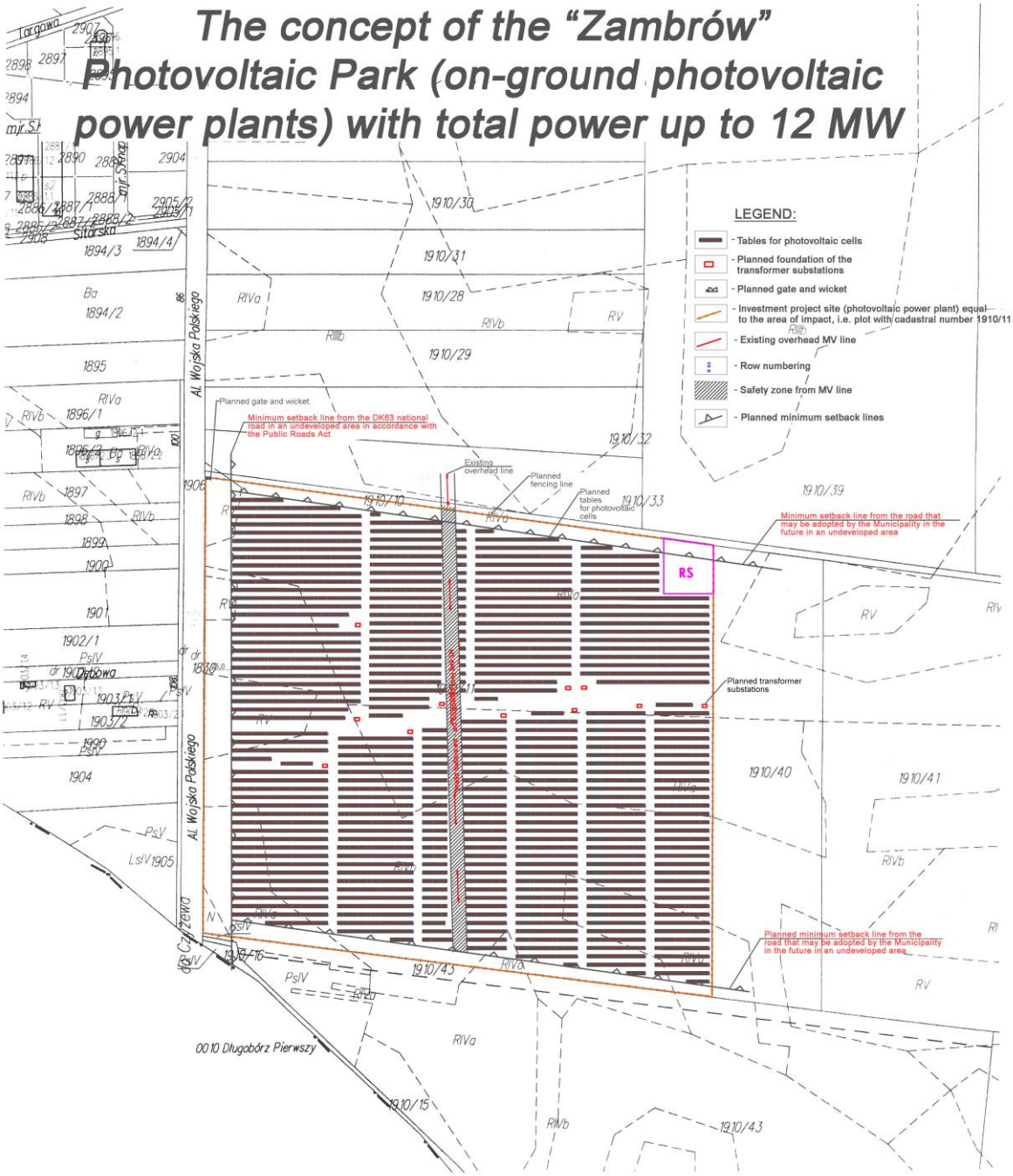
scale 1:1000

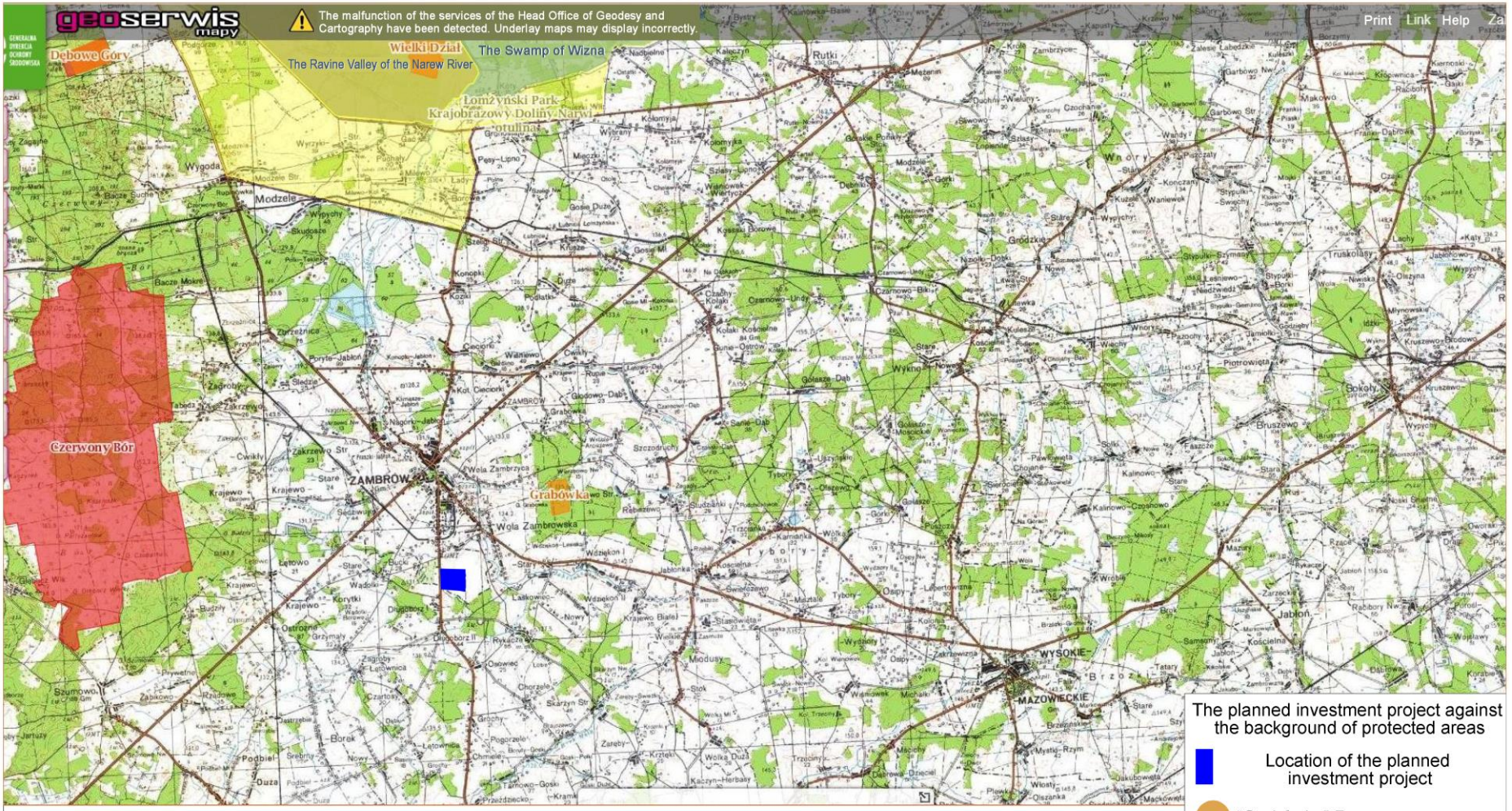
Cadastral unit 201401_1, city of Zambrów
precinct 201401.1.0001 Zambrów
Zambrów district
Podlaskie voivodeship

ZAMBRÓW DISTRICT GOVERNOR
18-300 Zambrów
ul. Fabryczna 3

Compliance with the land and building register
I hereby conclude as follows
Zambrów, on 2018 -09- 24

The concept of the "Zambrów" Photovoltaic Park (on-ground photovoltaic power plants) with total power up to 12 MW



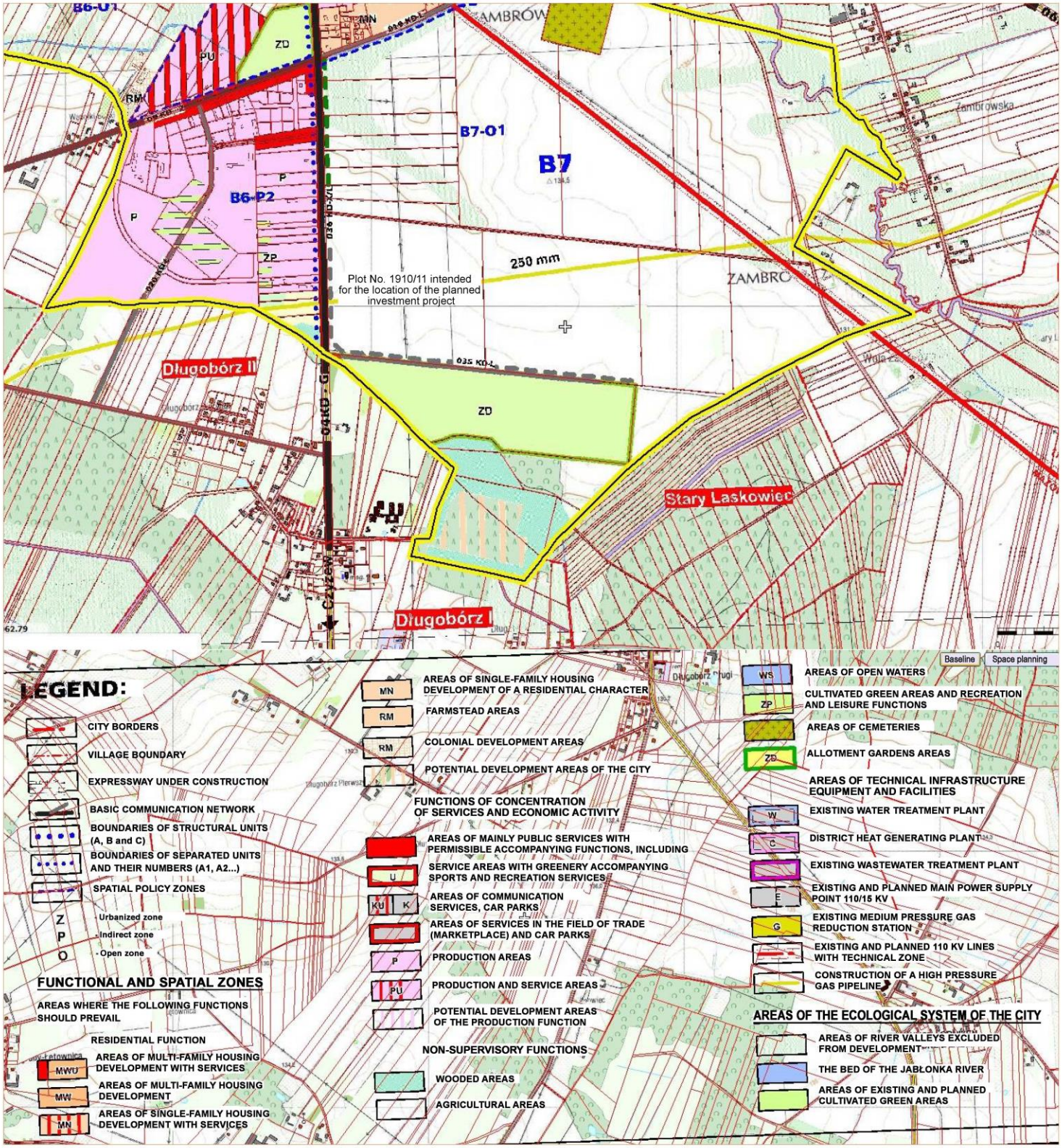

geoserwis
mapy
The malfunction of the services of the Head Office of Geodesy and Cartography have been detected. Underlay maps may display incorrectly.
Print
Link
Help
Dębowe Góry
Wielki Dział
The Ravine Valley of the Narew River
The Swamp of Wizna
Łomżyński Park Krajobrazowy Doliny Narwi
otulina
Wygoda
Modzele
Czerwony Bór
ZAMBRÓW
Grabówka
Wola Zambrowska
WYSOKIE MAZOWIECKIE
The planned investment project against the background of protected areas
Location of the planned investment project
"Grabówka" Reserve
The Łomżyński Landscape Park of the Narew River Valley – the buffer zone
"Czerwony Bór" NATURA 2000 area
NATURA 2000 area "The Ravine Valley of the Narew River"
NATURA 2000 area "The Swamp of Wizna"

Z-3.1 Photograph of the location of the investment project in question

Z-3.2 Photograph of the location of the investment project in question

Z-3.3 Photograph of the location of the investment project in question

Z-3.4 Photograph of the location of the investment project in question


B6-O1
ZD
PU
RM
MN
ZAMBRÓW
B7-O1
B7
B6-P2
P
ZP
250 mm
Plot No. 1910/11 intended for the location of the planned investment project
Długobórz II
ZD
Stary Laskowiec
Długobórz
Baseline
Space planning
LEGEND:
CITY BORDERS
VILLAGE BOUNDARY
EXPRESSWAY UNDER CONSTRUCTION
BASIC COMMUNICATION NETWORK
BOUNDARIES OF STRUCTURAL UNITS (A, B and C)
BOUNDARIES OF SEPARATED UNITS AND THEIR NUMBERS (A1, A2...)
SPATIAL POLICY ZONES
Z - Urbanized zone
P - Indirect zone
O - Open zone
FUNCTIONAL AND SPATIAL ZONES
AREAS WHERE THE FOLLOWING FUNCTIONS SHOULD PREVAIL
RESIDENTIAL FUNCTION
MWU AREAS OF MULTI-FAMILY HOUSING DEVELOPMENT WITH SERVICES
MW AREAS OF MULTI-FAMILY HOUSING DEVELOPMENT
MN AREAS OF SINGLE-FAMILY HOUSING DEVELOPMENT WITH SERVICES
MN AREAS OF SINGLE-FAMILY HOUSING DEVELOPMENT OF A RESIDENTIAL CHARACTER
RM FARMSTEAD AREAS
RM COLONIAL DEVELOPMENT AREAS
POTENTIAL DEVELOPMENT AREAS OF THE CITY
FUNCTIONS OF CONCENTRATION OF SERVICES AND ECONOMIC ACTIVITY
AREAS OF MAINLY PUBLIC SERVICES WITH PERMISSIBLE ACCOMPANYING FUNCTIONS, INCLUDING
U SERVICE AREAS WITH GREENERY ACCOMPANYING SPORTS AND RECREATION SERVICES
KU K AREAS OF COMMUNICATION SERVICES, CAR PARKS
AREAS OF SERVICES IN THE FIELD OF TRADE (MARKETPLACE) AND CAR PARKS
P PRODUCTION AREAS
PU PRODUCTION AND SERVICE AREAS
POTENTIAL DEVELOPMENT AREAS OF THE PRODUCTION FUNCTION
NON-SUPERVISORY FUNCTIONS
WOODED AREAS
AGRICULTURAL AREAS
WS AREAS OF OPEN WATERS
ZP CULTIVATED GREEN AREAS AND RECREATION AND LEISURE FUNCTIONS
AREAS OF CEMETERIES
ZD ALLOTMENT GARDENS AREAS
AREAS OF TECHNICAL INFRASTRUCTURE EQUIPMENT AND FACILITIES
W EXISTING WATER TREATMENT PLANT
C DISTRICT HEAT GENERATING PLANT
EXISTING WASTEWATER TREATMENT PLANT
E EXISTING AND PLANNED MAIN POWER SUPPLY POINT 110/15 KV
G EXISTING MEDIUM PRESSURE GAS REDUCTION STATION
EXISTING AND PLANNED 110 KV LINES WITH TECHNICAL ZONE
CONSTRUCTION OF A HIGH PRESSURE GAS PIPELINE
AREAS OF THE ECOLOGICAL SYSTEM OF THE CITY
AREAS OF RIVER VALLEYS EXCLUDED FROM DEVELOPMENT
THE BED OF THE JABŁONKA RIVER
AREAS OF EXISTING AND PLANNED CULTIVATED GREEN AREAS

Z-5.1 Photographs of an example photovoltaic system (solar power station) built in Poland.

Z-5.2 Photographs of an example photovoltaic system (solar power station) built in Poland.

ZAMBRÓW DISTRICT GOVERNOR 18-300 Zambrów ul. Fabryczna 3	Voivodeship	**Podlaskie**
	District	**Zambrów**
	Municipality	**ZAMBRÓW**
	Place	**ZAMBRÓW**
	Cadastral unit	**201401_1, ZAMBRÓW**
Register No: GK.6621.1775.2018	Cadastral district	**No 0001, ZAMBRÓW**

SIMPLIFIED EXTRACT FROM THE LAND REGISTER

REGISTER OF UNITS: **G896** KW: **LM1Z/00015898/0**

OWNERS

owner:

share: 1/1 OSLER DIANA (HENRYK,TERESA)

order No.: 04-803 WARSAW ul. WARSZTATOWA 6 B

S O I L S

PLOT DESIGNATION		More precise definition of the location	Definition of contours – land use and quality soil classes		AREA in ha		Land and mortgage register number or designation of other documents
Sheet	Plot No.		description	designat.	class I land uses	plot	
165	1910/11		arable land	RIVa	13.5396	23.3701	KW LM1Z/00015898/0
			arable land	RIVb	8.7272		
			arable land	RV	1.0365		
			wastelands	N	0.0668		
Plot parcel: 201401 _1.0001.1910/11 Supplementary data: Statistical division: 480790;							

Total area: **23.3701 ha**, in words: two hundred thirty-three thousand seven hundred and one m\2

Date of document preparation: **2018-08-20**, prepared by: Dorota Żychowska

This document is an extract from the descriptive data of the register of land and building and is not intended to be an entry in the land and mortgage register

Compliance with the land and building register

I hereby conclude as follows

Zambrów, on 2018-08-20

Per procura of the District Governor

Zenon Kaczmarczyk, M.Sc., Eng.
HEAD OF THE DIVISION
Geodesy, Cartography and Cadaster

Q.PLUS BFR-G4.1 270-280

PHOTOVOLTAIC MODULE Q.ANTUM

The new high performance Q.PLUS BFR-G4.1 module is ideal for all applications thanks to its innovative Q.ANTUM cellular technology. The world-record cell design was developed for best performance under actual conditions – even at low irradiation and on bright, hot summer days.

Q.ANTUM CELLULAR TECHNOLOGY: LOW COSTS OF CURRENT PRODUCTION

Higher yields per given area and lowest BOS costs due to high yield classes and efficiencies up to 17.1%.

INNOVATIVE TECHNOLOGY FOR ALL-WEATHER USE

Optimum yield in all weather conditions thanks to outstanding low-light and high temperature behavior.

LONG-TERM HIGH PERFORMANCE

Long-term yield security thanks to Anti PID Technology1, Hot-Spot Protect and Traceable Quality Tra.Q™ technologies.

ULTRALIGHT FRAME OF THE HIGHEST QUALITY

Frame made of modern aluminum alloy, designed for high loads of snow (5400 Pa) and wind (4000 Pa).

MAXIMUM COST REDUCTIONS

Logistic costs reduced by up to 10% due to the higher efficiency of the modular transport boxes.

SECURITY OF INVESTMENT PROJECT

Security of investment project covered by a 12-year product warranty and a 25-year warranty for linear plant operation[2].

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2015

Q CELLS POWER YIELD WARRANTY
- ANTI PID TECHNOLOGY (APT)
- HOT-SPOT PROTECT (HSP)
- TRACEABLE QUALITY (TRA.Q™)

VDE Quality Tested
- high reliability
- insignificant degradation
- regular product inspection

ID. 40032587

Photon
Q CELLS
The best polycrystalline photovoltaic module 2014
Q.PRO-G2 235
Test performed on 174 modules

[1] Test conditions: Cells at –1500 V with respect to grounded, metal foil-covered module surface, 25°C, 168 h

[2] Further information can be found on the reverse side.

IDEAL SOLUTION FOR:

Private overhead systems

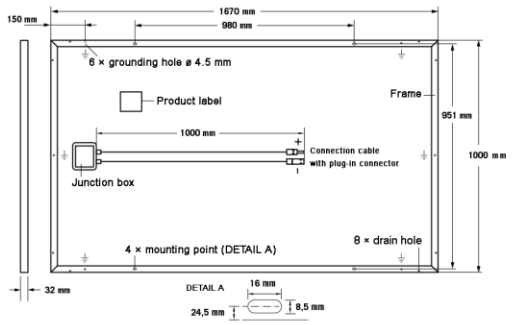
Commercial and industrial overhead systems

Engineered in **Germany**

Q CELLS

MECHANICAL SPECIFICATION

Dimensions	1670 mm × 1000 mm × 32 mm (including the frame)
Weight	18,8 kg
Front coating	3.2 mm thermally strengthened glass with anti-reflective technology
Rear coating	multilayer foil
Frame	anodized aluminum
Cell	6 × 10 Q.ANTUM solar cells
Socket connection	77 mm × 90 mm × 15.8 mm Protection rating IP67, with bypass diodes
Cable	4 mm² solar cable; (+) ≥ 1000 mm, (-) ≥ 1000 mm
Plug-in device	MC4, IP68

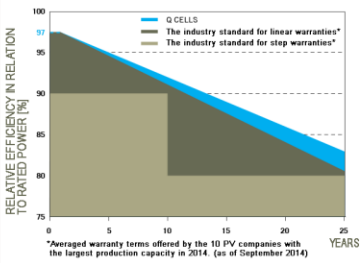


ELECTRICAL FEATURES

RATINGS OF THE OPERATION				270	275	280
MINIMUM EFFICIENCY UNDER STANDARD TEST CONDITIONS, STC1 (POWER TOLERANCE +5 W / -0 W)						
Minimum	Power in MPP[2] point	P_{MPP}	[W]	270	275	280
	Short circuit current*	I_{SC}	[A]	9,29	9,35	9,41
	Idle voltage*	U_{OC}	[V]	38,46	38,72	38,97
	Current in MPP point*	I_{MPP}	[A]	8,70	8,77	8,84
	Voltage in MPP point*	U_{MPP}	[V]	31,04	31,36	31,67
	Efficiency[2]	η	[%]	≥16,2	≥16,5	≥16,8
MINIMUM EFFICIENCY UNDER NORMAL OPERATING CONDITIONS, NIGHT[3]						
Minimum	Power in MPP[2] point	P_{MPP}	[W]	199,6	203,3	207,0
	Short circuit current*	I_{SC}	[A]	7,49	7,54	7,58
	Idle voltage*	U_{OC}	[V]	35,89	36,13	36,37
	Current in MPP point*	I_{MPP}	[A]	6,81	6,87	6,93
	Voltage in MPP point*	U_{MPP}	[V]	29,30	29,59	29,87

[1]1000 W/m², 25 °C, AM 1.5 G spectrum [2]Tolerances on STC measurements ± 3%; NIGHT ± 5% [3]800 W/m², NOCT, AM 1.5 G spectrum * Standard values, actual values may differ

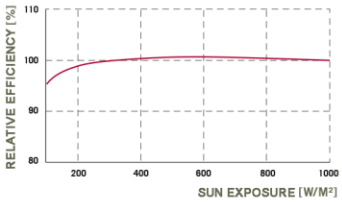
PERFORMANCE WARRANTY Q CELLS



Minimum of 97% of rated capacity within the first year. Then a decrease of up to 0.6% per year.
At least 92% of rated power after 10 years.
At least 83% of rated power after 25 years.

All data within measurement tolerances. Full product and performance warranty in accordance with the current warranties of the Q CELLS distribution companies in respective country.

PERFORMANCE IN LOW SUN ECPOSURE



Typical module performance under low irradiation conditions comparing with STC conditions (25 °C, 1000 W/m²).

TEMPERATURE FACTOR

Temperature-related current coefficient I_{SC}	α	[%/K]	+0,04	Temperature-related voltage coefficient U_{OC}	β	[%/K]	−0,29
Temperature-related power factor P_{MPP}	γ	[%/K]	−0,40	Cell temperature at rated operation	NOCT	[°C]	45

PARAMETERS FOR SYSTEM CONNECTION

Maximum system voltage	U_{SYS}	[V]	1000	Safety class	II	
Maximum reverse current	I_R	[A]	20	Fire protection	C	
Wind / snow load (Load test in accordance with IEC 61215)		[Pa]	4000/5400	Permissible module temperature for continuous operation	−40 °C – +85 °C	

QUALIFICATIONS AND CERTIFICATIONS

VDE Quality Tested; IEC 61215 (ver. 2); IEC 61730 (ver. 1), application class A
This material safety data sheet complies with DIN EN 50380.

PARTNER

GUIDELINE: It is necessary to follow the guidelines in the installation instructions. For further information on the correct use of the product, please refer to the installation and operating instructions or contact the technical service.

Hanwha Q CELLS GmbH
Sonnenallee 17-21, 06766 Bitterfeld-Wolfen, Germany | TEL +49 (0)3494 66 99-23444 | FAX +49 (0)3494 66 99-23000 | EMAIL sales@q-cells.com | WEB www.q-cells.com

Engineered in **Germany**

Serial inverter (SUN2000-36KTL)

Smart

- 4 MPPT systems to suit different types or numbers of modules with different settings
- Smart monitoring of 8 chains and 80% time savings on failure detection
- Power Line Communication (PLC)

Secure

- Integrated DC disconnector, safe and easy to operate
- Integrated AC and DC overvoltage protection type H
- Earth fault protection
- Residual-current device (RCD)

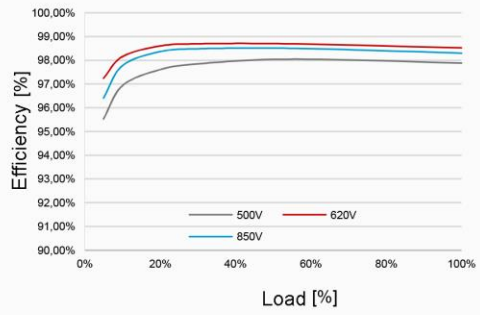
Operational

- Max. efficiency 98.6%, European efficiency 98.3%

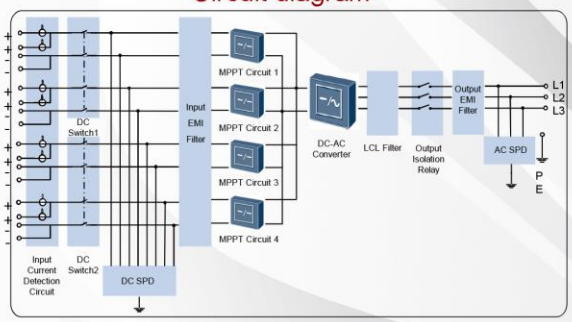
Reliable

- It is not necessary to install an external fan due to natural cooling technology
- IP rating IP65

Performance curve



Circuit diagram



SUN2000-36KTL

Always Available for Highest Yields

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Serial inverter (SUN2000-36KTL)

Technical specifications	SUN2000-36KTL
	Efficiency
Max. efficiency	98.6%
European efficiency	98.3%
	Input
Max. DC input power	40,800 W
Max. input voltage	1,100 V
Max. current on MPPT	22 A
Max. short circuit current on MPPT	30 A
Min. operational voltage / initial input voltage	200 V / 250 V
Voltage range at full MPPT power	480 V ~ 850 V @380Vac/ 400Vac 580V~850V@480Vac
MPPT operational voltage range	200 V ~ 1000 V
Rated input voltage	620 V @380Vac / 400Vac 720V@480Vac
Max. number of inputs	8
MPPT quantity	4
	Outlet
Rated AC output power	36,000 W
Max. AC output power	40,000 VA
Max. AC power (cosφ=1)	Factory defaults 40.000 W; 36.000 W option in default
Rated output voltage	220 V / 380 V, 230 V / 400 V, Factory defaults 3 W+N+PE; 3 W+PE option in default 277 V/480 V, 3 W+PE
AC power supply frequency	50 Hz / 60 Hz
Maximum output current	60.8 A/57.8A/48.2A
Controlled phase shift factor	0.8 LG ... 0.8 LD
Max. total harmonic disruptions	< 3%
	Protection
Disconnection protection at the output side	Yes
Anti-Islanding protection	Yes
DC over-polarization protection	Yes
PV collector chain failure monitoring	Yes
DC overvoltage protection	II type
AC overvoltage protection	II type
Insulation monitoring	Yes
Residual current detection	Yes
	Circulation
Display	LED indicators
USB / Bluetooth +APP	Yes
RS485	Yes
PLC	Yes
Fast Ethernet	Option
	General data
Dimensions (W × H × D)	930 × 550 × 260 mm (36.6 x 21.7 x 10.2 inch)
Weight	55 kg (121 lb.)
Operating temperature range	-25 °C ~ 60 °C (-13°F ~ 140°F)
Cooling	Natural convection
Operation height	0 ~ 4,000 m (13,123 ft.)
Relative humidity	0 ~ 100%
DC connector	Amphenol H4
AC connector	Waterproof PG Terminal + OT Connector
Protection rating	IP65
Own current consumption at night	< 1 W
Topology	Without the transformer
	Compliance with the standards
Electromagnetic Security / Electromagnetic Compatibility (EMC)	EN/IEC 61000-1, EN/IEC 61000-2, EN/IEC 61000-3, EN/IEC 61000-4, EN/IEC 62109-1, EN/IEC 62109-2
Network connection standards	VDE-AR-N4105, VDE0126-1-1, BDEW 2008, G59/3, UTE C 15-712-1

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1.1.4 Station type MR-w-bpp 15 / 1000-3 / 3P

MRw-bpp 15/1000-3 /3P

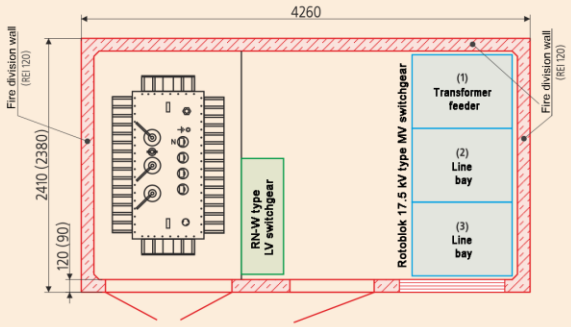
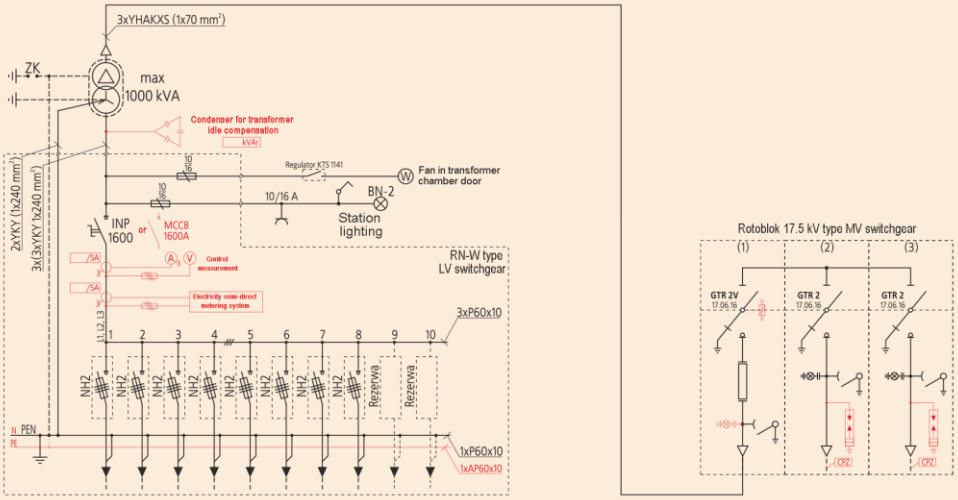
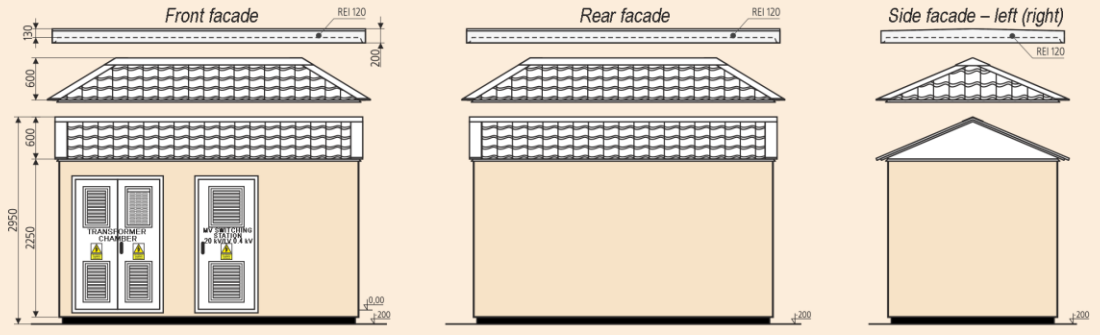


Diagram of standard station type MRw-bpp 15/1000-3/3P



Facades of MRw-bpp 15/1000-3/3P type stations



Weight:

- foundation	5400 kg
- main body	13000 kg
- roof	
- concrete	4000 kg
- metal	450-600 kg
Usable floor area:	8,72 m²

Note:
The red color indicates the optional equipment of the station.
More on the selection of switchboards and their equipment can be found in chapters 2 and 3 of the catalog.

		Type	Max. number of MV bays (LV outlets)
MV switch-gear	Standard execution	Rotoblok 17,5 kV	3
		Rotoblok SF	4
LV switch-gear	Standard execution	RN-W	10
	Non-standard execution	RN-W	19
Maximum power of the transformer –1000 kVA		Housing class – 20	

GK.6621.2027.2018

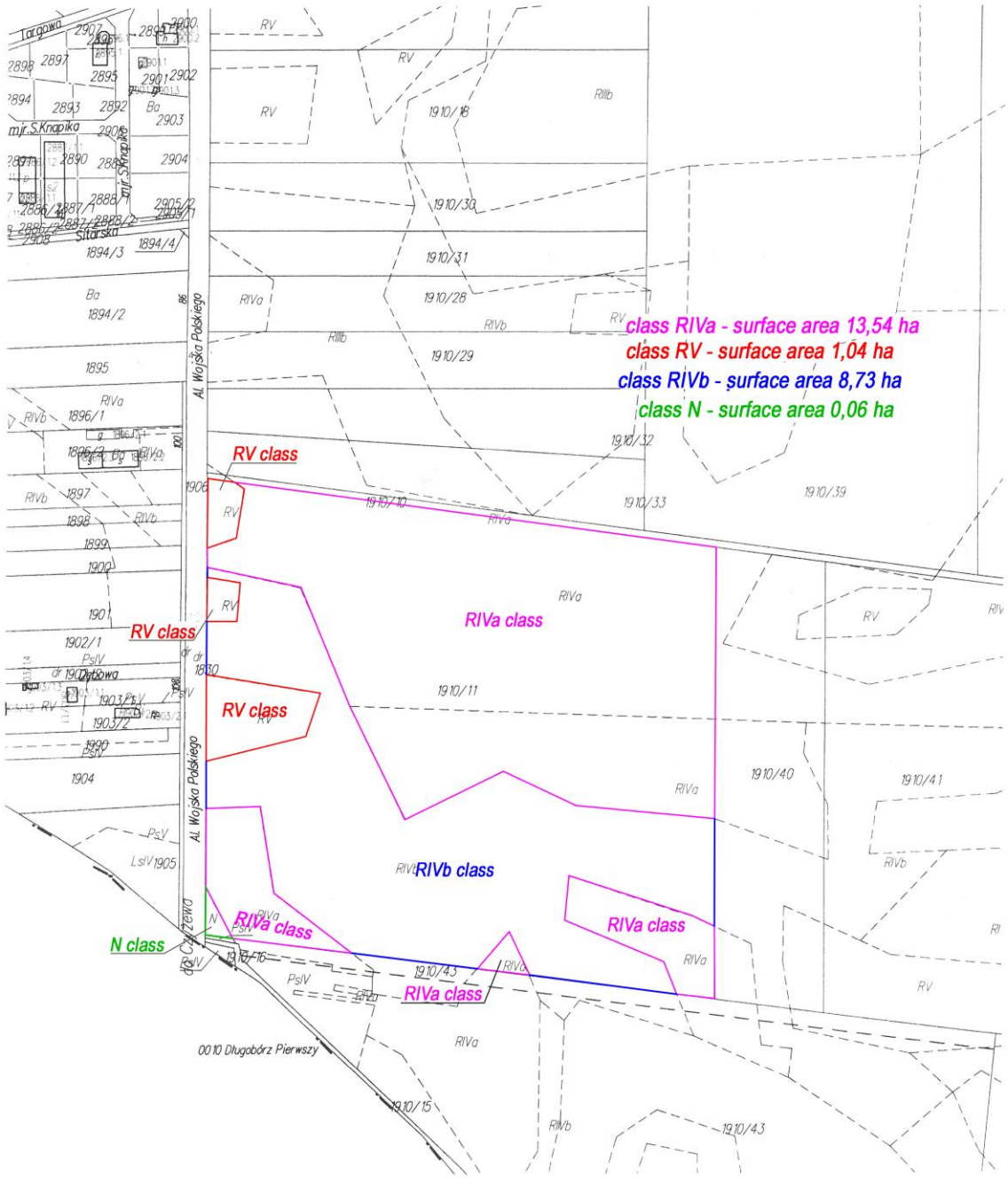
COPY OF THE CADASTRAL MAP

scale 1:1000

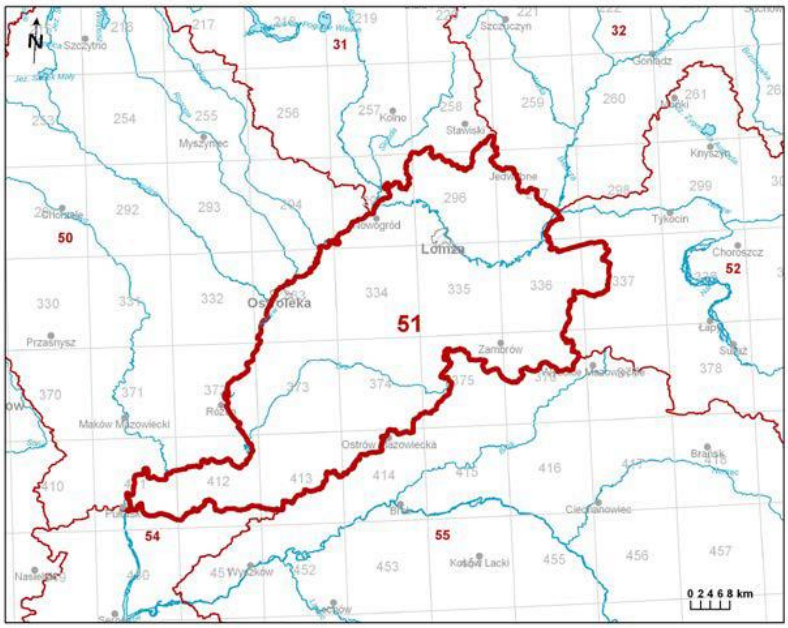
Cadastral unit 201401_1, city of Zambrów
precinct 201401.1.0001 Zambrów
Zambrów district
Podlaskie voivodeship

ZAMBRÓW DISTRICT GOVERNOR
18-300 Zambrów
ul. Fabryczna 3

Compliance with the land and building register
I hereby conclude as follows
Zambrów, on 2018-09-24

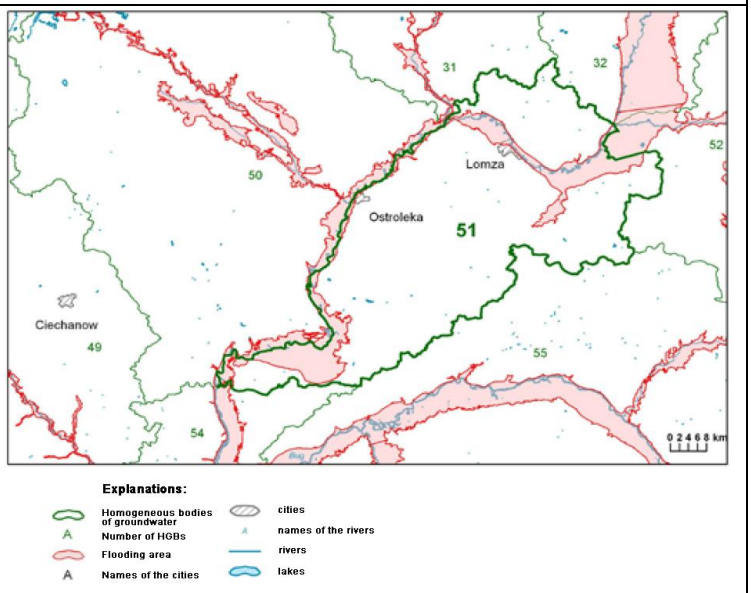


Number of HGBs: 51	**HGBs surface area [km²]:** 3147.0	
EU ID:	PLGW200051	
Administrative location		
Voivodeship	District	Communes
Mazovian	City of Ostrołęka	City of Ostrołęka
	ostrołęcki	Lelis, Rzekuń, Olszewo-Borki, Troszyn, Czerwin, Goworowo
	makowski	Różan (city), Różan (rural area), Młynarze, Rzewnie, Szelków
	ostrowski	Stary Lubotyń, Ostrów Mazowiecka (city), Ostrów Mazowiecka (rural area), Wąsewo
	pułtuski	Pułtusk (city), Pułtusk (rural area), Obryte
	wyszkowski	Długosiodło, Rząśnik, Brańszczyk
Podlaskie	kolneński	Stawiski (rural area), Mały Płock
	moniecki	Trzcianne
	białostocki	Zawady
	łomżyński	Jedwabne (city), Jedwabne (rural area), Nowogród (city), Nowogród (rural area), Przytuły, Zbójna, Piątnica, Wizna, Łomża, Miastkowo, Śniadowo
	City of Łomża	City of Łomża
	zambrowski	Rutki, Zambrów, Zambrów (urban municipality), Kołaki Kościelne, Szumowo
	wysokomazowiecki	Kobylin-Borzymy, Kulesze Kościelne, Wysokie Mazowieckie
Geographic coordinates	21°05'30.4984" - 22°36'14.4123" 52°41'04.4792" - 53°20'57.5317"	
Map with the location of HGBs		



<table>
<tr><td colspan="6">Geographical location</td></tr>
<tr><td rowspan="6">Physical and geographical region (Kondracki, 2009)</td><td colspan="5">Province: Central European Plain (31)</td></tr>
<tr><td colspan="5">Subprovince: Central Polish Lowlands (318)</td></tr>
<tr><td colspan="2">Macroregion:
North Mazovian Lowland (318.6)</td><td colspan="3">Mesoregions:
Ciechanów Upland (318.64)
Kurpiowska Plain (318.65)
Lower Narew Valley (318.66)
Międzyrzecze Łomżyńskie (318.67)</td></tr>
<tr><td colspan="5">Province: Eastern Baltic-Belarusian Plain (84)</td></tr>
<tr><td colspan="5">Subprovince: Podlasie-Belarusian Uplands (843)</td></tr>
<tr><td colspan="2">Macroregion:
North Podlasie Lowland (843.3)</td><td colspan="3">Mesoregions:
Kolno Upland (843.31)
Biebrza Basin (843.32)
Wysokomazowiecka Upland (843.35)</td></tr>
<tr><td colspan="6">Hydrological and hydrogeological location</td></tr>
<tr><td>River Basin</td><td colspan="5">Vistula River</td></tr>
<tr><td>Water region RZGW</td><td colspan="5">The Middle Vistula River
RZGW in Warsaw</td></tr>
<tr><td>The main drainage area of HGBs (drainage row)</td><td colspan="5">Narew river
(II)</td></tr>
<tr><td>Balance area</td><td colspan="5">Z-12 Narew river from Biebrza to Pułtusk, excluding WJM and Pisa basin</td></tr>
<tr><td>Hydrogeological region (Paczyński, 1995)</td><td colspan="5">I – Masovian</td></tr>
<tr><td colspan="6">Site development
(source: Corin Land Cover layer)</td></tr>
<tr><td colspan="3">% of anthropogenic areas</td><td colspan="3">2.33</td></tr>
<tr><td colspan="3">% of agricultural areas</td><td colspan="3">70.76</td></tr>
<tr><td colspan="3">% of forest and green areas</td><td colspan="3">26.57</td></tr>
<tr><td colspan="3">% of wetlands</td><td colspan="3">0.04</td></tr>
<tr><td colspan="3">% of water areas</td><td colspan="3">0.31</td></tr>
<tr><td colspan="6">HYDROGEOLOGY</td></tr>
<tr><td colspan="3">Number of aquifers</td><td colspan="3">2</td></tr>
<tr><td colspan="6">Aquifer characteristics (from the ground surface)</td></tr>
<tr><td rowspan="3">Quaternary aquifer</td><td rowspan="3">Level Q_1</td><td>Stratigraphy</td><td>Lithology</td><td colspan="2">Aquifer characteristics</td></tr>
<tr><td>quaternary (holocene/pleistocene)</td><td>sands+gravels</td><td colspan="2">pore</td></tr>
<tr><td>Nature of the water table</td><td colspan="3">Depth of aquifers of the level;
from – to [m]</td></tr>
</table>

		free	0-44.2		
		Hydrogeological parameters of the aquifer			
		thickness from – to	filtration coefficient from – to	conductivity	drainage capacity / medium resilient capacity
		[m]	[m/h]	[m2/h]	
		0-42.9	0.05-4.43	0-113.4	-
	Level Q_2	**Stratigraphy**	**Lithology**	**Aquifer characteristics**	
		quaternary (pleistocene)	sands+gravels	pore	
		Nature of the water table	**Depth of aquifers of the level; from – to [m]**		
		confined, partly free	0-60		
		Hydrogeological parameters of the aquifer			
		thickness from – to	filtration coefficient from – to	conductivity	drainage capacity / medium resilient capacity
		[m]	[m/h]	[m2/h]	
		0-86.2	0.01-2.78	0-51.9	-
	Level Q_3	**Stratigraphy**	**Lithology**	**Aquifer characteristics**	
		quaternary (pleistocene)	sands+gravels	pore	
		Nature of the water table	**Depth of aquifers of the level; from – to [m]**		
		confined	33-132.5		
		Hydrogeological parameters of the aquifer			
		thickness from – to	filtration coefficient from – to	conductivity	drainage capacity / medium resilient capacity
		[m]	[m/h]	[m2/h]	
		0-62	0.03-2.69	0-74.8	-
	Level Q_4	Stratigraphy	Lithology	Aquifer characteristics	
		quaternary (pleistocene)	sands+gravels	pore	
		Nature of the water table	**Depth of aquifers of the level; from – to [m]**		
		confined	52-228		
		Hydrogeological parameters of the aquifer			
		thickness from – to	filtration coefficient from – to	conductivity	drainage capacity / medium resilient capacity
		[m]	[m/h]	[m2/h]	
		0-24	0.003-4.1	0-23.3	-

	Groundwater chemical types (natural/different from natural types)			
	Natural types: HCO_3-Ca (bicarbonate-calcium waters), HCO_3-Ca-Mg (bicarbonate-calcium-magnesium waters)			
Paleogene-Neogene aquifer (Pg-Ng)	**Stratigraphy**	**Lithology**	**Aquifer characteristics**	
	neogene (Pliocene, Miocene) Paleogene (Oligocene, Eocene)	sands+brown coal, sands+gravels, glauconite sands	pore	
	Nature of the water table	**Depth of aquifers of the level; from – to [m]**		
	confined	56.5-201		
	Hydrogeological parameters of the aquifer			
	thickness from – to	filtration coefficient from – to	conductivity	drainage capacity / medium resilient capacity
	[m]	[m/h]	[m2/h]	
	-	0.01-0.41	-	-
	Groundwater chemical types (natural/different from natural types)			
	Natural types: HCO_3-Ca-Mg (bicarbonate-calcium-magnesium waters), HCO_3-Ca-Mg (bicarbonate-calcium-magnesium-sodium waters)			
Risk of drought (source: Institute of Meteorology and Water Management)	Number of low water levels (hydrological droughts) from 1951 to 2000: 8-15 – in the southern part 16-23 – in the northern part			
Risk of flooding (source: Map of areas at risk of flooding, 2007)				
Water circulation diagram				
The structure of HGBs 51 is composed of five aquifers separated by impermeable formations. Each of these aquifers has a slightly different arrangement of water recharge and drainage areas. The unit area is not a closed facility in the hydrogeological sense. The waters flow laterally from outside				

the area of HGBs 51, mainly from the north and northeast in the region of Łomża and from the south between Pułtusk and Ostrów Mazowiecka.

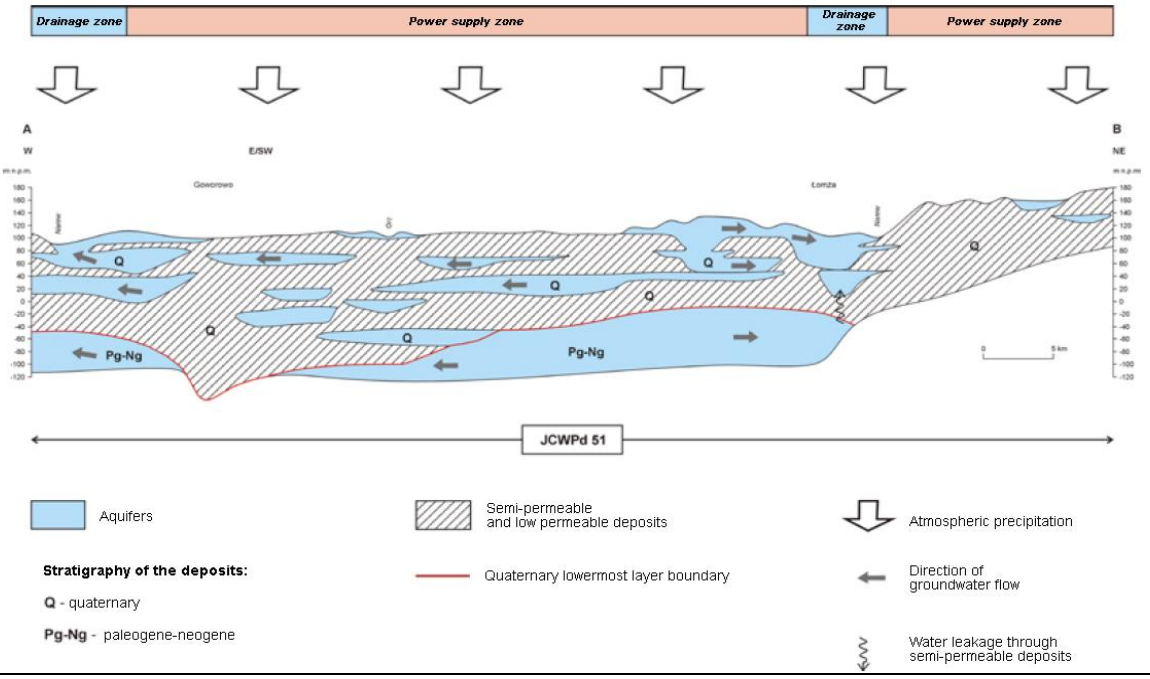
The **Q1** near-surface aquifer is virtually uninsulated from the land surface, allowing it to be supplied infiltrationally. Supply zones are associated with local surface water watersheds. Whereas, groundwater is drained by rivers. The water circulation system of the near-surface aquifer is eminently local.

The **Q2** aquifer in most of the area is isolated from the land surface by a packet of tills. Its power supply is by leakage of water through impermeable formations. It is also possible to power supply it through hydrogeological windows from the **Q1** aquifer. Locally, the settlements that make up the Q2 aquifer are exposed on the ground surface, allowing the aquifer to be powered by rainwater infiltration. The drainage base of this aquifer is mainly the Narew River and its main tributaries: Biebrza, Cetna, Jabłonka in the north; Orz, Wymakracz in the south of the unit. The Q2 aquifer is zonally (mainly in the Narew Valley and locally in the upland) in direct contact with the Q3 aquifer.

The **Q3** aquifer is isolated from the ground surface. It is powered by water leakage through impermeable formations and through hydrogeological windows from the Q2 aquifer. This aquifer is drained primarily by the Narew River.

The **Q4** aquifer is completely isolated from the ground surface. It is supplied by leakage through impermeable formations and the groundwater is presumably drained by the Narew river. The horizon is locally in direct hydraulic contact with the Paleogene-Neogene aquifer.

The **Pg-Ng** aquifer is powered by leakage from the quaternary aquifer and infiltration of rainwater on Miocene, Oligocene and Eocene sand outcrops outside the unit area. The drainage base of this aquifer is the Narew river.



Surface water ecosystems and terrestrial ecosystems dependent on groundwater	
Share of groundwater power supply in the total outflow of rivers within HGBs	59%
Groundwater-dependent terrestrial ecosystems (source: GIS layer)	Boggy lands (33% of protected areas)
Assessment of the status of HGBs, in relation to groundwater impacts on groundwater-dependent terrestrial ecosystems, 2012.	Good DW (with sufficient reliability)
Protected areas within the boundaries of HGBs	
<u>Nature reserves:</u>	

The Swamp of Wizna II
Grabówka
Wielki Dział
Rycerski Kierz
Kalinowo
Dębowe Góry
Bartnia

Natura 2000 network – special habitat protection areas:

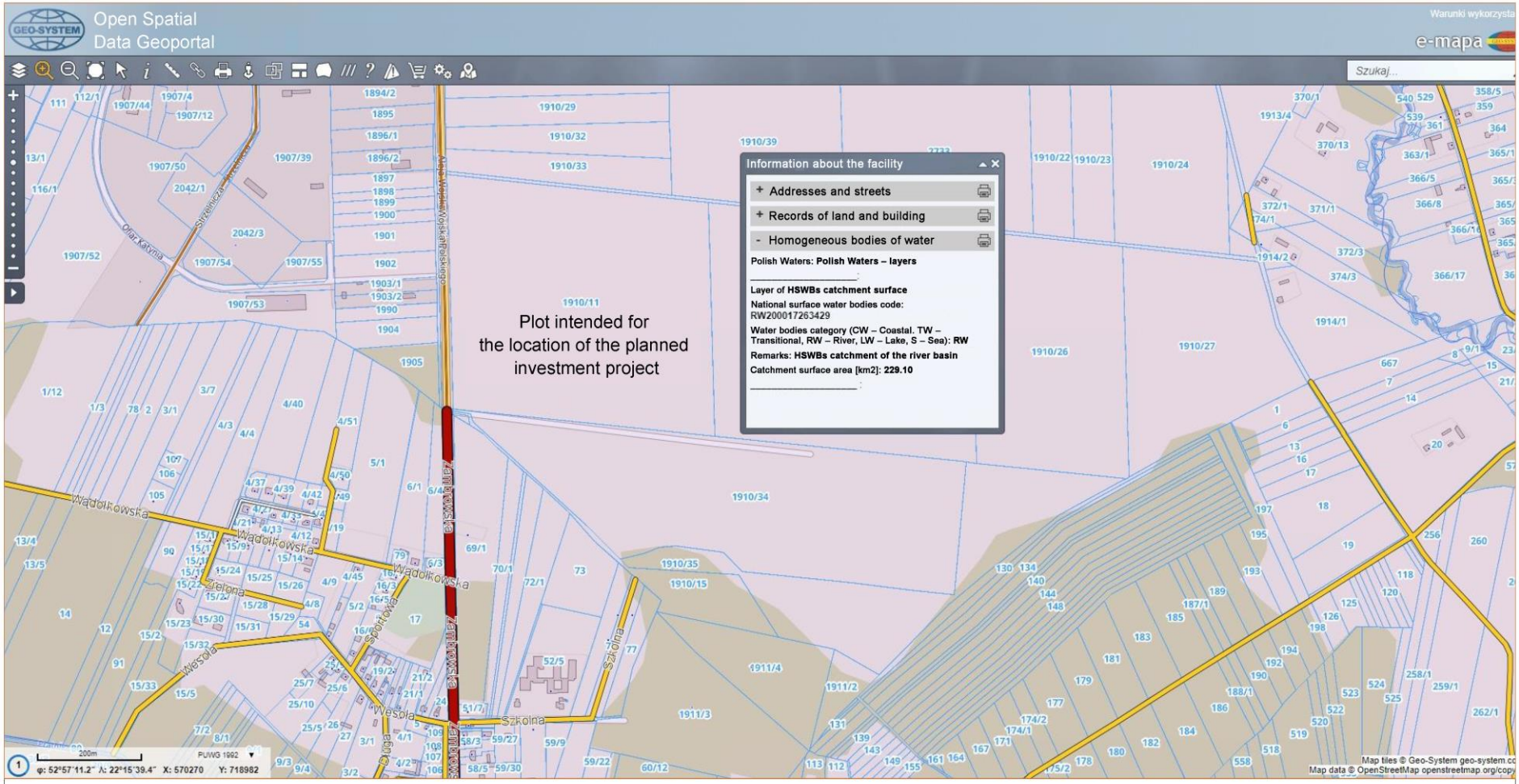
PLH200023	Pisa Valley
PLH200020	Kolno and Kurpiowskie Boggy lands
PLH200004	Ostoja Narwiańska
PLH200018	Czerwony Bór
PLH200008	Biebrza Valley

Natura 2000 network – special birds protection areas:

PLB140014	Lower Narew Valley
PLB200008	The Ravine Valley of the Narew River
PLB140007	Puszcza Biała
PLB200005	The Swamp of Wizna
PLB200006	Ostoja Biebrzańska
PLB140015	Pulwy swamp

Human impact on the environment	
Depression funnels (regional-local funnels) associated with groundwater extraction, mine drainage, impact of agglomerations, etc. (source: Hydrogeological Map of Poland 1:50,000, Update of information layers of the GIS database of the Hydrogeological Map of Poland "hydrodynamics of the main usable aquifer (GUPW) and the first aquifer (PPW)", 2012.)	Local depression cones associated with groundwater extraction
Ingression or ascension of saline water into groundwater	None
Artificial renewal of resources	None
Water intake [thousand m^3 a year] – registered intake – 2011	
for public water supply, industry and others	15 256.81
from mine drainage	-
Groundwater resources available for development [m^3/d]	
resources	465999
% of resource utilization	9
Area of pollution sources	
Areas particularly vulnerable to pollution by nitrates of agricultural origin (source: GIS layer – OSN (Areas Particularly Vulnerable))	OSN in the drainage basins of the Bug River tributaries from Toczna to Brok (Regulation No. 4/2012 of the Regional Water Management Board Director of 10.07.12 Regulation No. 14/2012 of the Regional Water Management Board director of

	8.10.12) OSN in the drainage basin of the Narew tributaries from Orze to Pełta (Regulation No 4/2012 of the Regional Water Management Board Director of 10.07.12) OSN in the drainage basin of the Jabłonka River and its tributaries (Regulation No 14/2012 of the Regional Water Management Board Director of 8.10.12)	
Urban areas	Cities with the number of inhabitants from 10 to 50 thousand	Zambrów
	Cities with the number of inhabitants from 50 to 200 thousand	Ostrołęka, Łomża
	Cities with a population over 200,000	-
Assessment of the status of HGBs, 2012.		
Quantity status	good	
Chemical status	good	
Overall assessment of the status of the HGBs	good	
Evaluation of risk of failing to meet environmental targets	not at risk	
Reason for the risk of not achieving the environmental objectives	-	


Open Spatial
Data Geoportal
e-mapa
Szukaj...
Information about the facility
+ Addresses and streets
+ Records of land and building
- Homogeneous bodies of water
Polish Waters: Polish Waters – layers
Layer of HSWBs catchment surface
National surface water bodies code:
RW200017263429
Water bodies category (CW – Coastal. TW – Transitional, RW – River, LW – Lake, S – Sea): RW
Remarks: HSWBs catchment of the river basin
Catchment surface area [km2]: 229.10
Plot intended for
the location of the planned
investment project
Wadolkowska
Zielona
Wesoła
Sportowa
Szkolna
Długa
Map tiles © Geo-System geo-system.cc
Map data © OpenStreetMap openstreetmap.org/copy