PROJECT INFORMATION SHEET

SUBJECT OF THE STUDY:

Construction of the "Reszel" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 6 MW

ADDRESS OF THE FACILITY:

Dębnik,
cadastral district 0004 – Dębnik
Reszel Municipality, Kętrzyn District,
Warmińsko-Mazurskie Voivodeship
plots No. 37/7, 37/8

INVESTOR:

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

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Prepared by Signature of the Investor

COPY No. 1

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1. CEL I PRZEDMIOT OPRACOWANIA

The subject of this study is the information sheet for the project involving a comprehensive construction of the "Reszel" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 6 MW. The planned project will be located on plots No. 37/7, 37/8 – 0004 Dębnik with a total area of 14.0877 ha in Dębnik, Reszel Municipality, Kętrzyn District, Warmińsko-Mazurskie Voivodeship. The plots are the property of private owners, who are willing to provide 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 "Reszel" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 6 MW.

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

Plot numbers	Owners	Home address
37/7	Bożena Piątek	ul. Świerkowa 11 18-400 Łomża
37/8	Izabela Sekścińska	ul. Wiosenna 25D 18-400 Łomża

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 62a 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 the photovoltaic system meets the requirements relating to the project information sheet set out in Article 62a 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 project is included in the category of projects *that may potentially significantly affect the environment*, for which the obligation to prepare an environmental impact assessment 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 the 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 the 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 "Reszel" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 6 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 "Reszel" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 6 MW producing electricity from the sun. The designed photovoltaic park will be located on plots No. 37/7, 37/8 – 0004 Dębnik in Dębnik in the northern part of the Reszel Municipality.

In this Project Information Sheet it was requested to issue the decision on environmental conditions taking into account the two described project options, i.e.:

1. **6 photovoltaic power plants with a capacity of up to 1 MW – preferred option;**
2. **1 photovoltaic power plant with a capacity of up to 6 MW – alternative option.**

This procedure is dictated by the fact that the possibility of obtaining the technical conditions for network connection from the DSO occurs only after obtaining the aforementioned decision and also after obtaining the decision on development conditions. In this case, the Investor would like to keep the possibility of deciding according to the described options without the necessity of re-applying for new administrative decisions, especially that the said decisions in each option cover the area of the entire plots No. 37/7, 37/8 – 0004 Dębnik.

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

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

4.1. Main technical parameters

The planned "Reszel" 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 6 MW – about 6,500 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 6 MW – up to 21428 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 6 MW, the installed capacity cannot exceed 6 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 6 MW		
PANEL CAPACITY [W]	NUMBER [pcs]		PANEL CAPACITY [W]	NUMBER [pcs]	
	Min. number	Max. number		Min. number	Max. number
280W	3562	3570	280W	21420	21428
285W	3500	3508	285W	21044	21052
290W	3440	3448	290W	20680	20688
295W	3380	3388	295W	20330	20338
300W	3324	3332	300W	19982	20000
305W	3270	3278	305W	19664	19672
310W	3216	3224	310W	19346	19354
315W	3166	3174	315W	19038	19046
320W	3116	3124	320W	18742	18750
325W	3068	3076	325W	18452	18460
330W	3032	3030	330W	18172	18180

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. with a capacity of 30 kW to 200 kW for systems with a capacity of up to 1 MW each, while for one system with a capacity of up to 6 MW the number of inverters will range from 30 to 200 pcs. with a capacity of 30 kW to 200 kW. 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 "Reszel" photovoltaic park will be connected to the power system. The option assuming the construction of 6 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 at the border of the Reszel Main Power Supply Point, from where the power operator will lead out the MV-15 kV cable line towards the Main Power Supply Point located in direct vicinity of the planned project. The second option assuming the construction of one farm with a capacity of up to 6 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 Reszel Main Power Supply Point. The final location for connection of the planned "Reszel" 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 "Reszel" photovoltaic park is to be located in Dębnik (Reszel Municipality, Kętrzyn District, Warmińsko-Mazurskie Voivodeship) on plots No. 37/7, 37/8 with a total area of 14.0877 ha. The area for the project is located in the northern part of Reszel Municipality, in Dębnik, in a location favorable for this type of facilities.

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

- from the north – at a distance of approx. 1100 m;
- from the south – at a distance of approx. 1400 m;
- from the west – at a distance of approx. 900 m;
- from the east – at a distance of approx. 650 m.

Access to the plots on which the "Reszel" photovoltaic park with a total capacity of up to 6 MW will be located, will be provided by the existing roads: the internal road designated as plot No. 7/1 or the public road (regional road) designated as plot No. 286, and then by unpaved access roads located on the plots included in the study.

A map with the location of the plots in question and the preliminary concept of the "Reszel" photovoltaic park with a total capacity of up to 6 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".

Having consulted the Reszel Municipality and on the basis of the Investor's knowledge, no other projects of this type are planned or exist in the immediate vicinity of plots No. 37/7, 37/8 – 0004 Dębnik, which are the location of the planned project.

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 6 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 plots No. 37/7, 37/8 – 0004 Dębnik.

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 6 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 6 MW, there is no possibility of cumulative impacts due to the fact that the scope of impacts will be enclosed within one common fence for the entire farm on plots No. 37/7, 37/8.

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 "Reszel" photovoltaic park with a total capacity of up to 6 MW is planned in the area of approx. 14.0877 ha, i.e. in the entire area of plots No. 37/7, 37/8 – 0004 Dębnik. The plots are located in Dębnik, Reszel Municipality, Kętrzyn District, Warmińsko-Mazurskie Voivodeship.

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

Photos showing the plots 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 "Reszel" photovoltaic park with a total capacity of up to 6 MW will be built on plots No. 37/7, 37/8 – 0004 Dębnik.

Option 1 (6 power plants with a capacity of up to 1 MW) provides for fencing off each of the six 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 6 MW) provides for fencing the entire area of the photovoltaic farm. The total area to be fenced off will amount to 14.0877 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 "RESZEL" PHOTOVOLTAIC PARK INCLUDING DEVICES

6.1. Facilities and devices of photovoltaic systems.

The "Reszel" photovoltaic park with a total capacity of up to 6 MW, planned in Dębnik, will produce electricity from solar energy through the process of converting solar energy to electricity.

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

Option 1 – 6 photovoltaic power plants with a capacity of up to 1 MW each:

1. Table structures for photovoltaic modules with an area of 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 3570 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 6 MW:

1. Table structures for photovoltaic modules with an area of up to 13 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 21428 pcs = 5999.84 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 plots it is not planned to execute a paved yard and equip the area with the sanitary sewerage and rainwater drainage, district heating, water supply and gas networks.

6.2. Planned development area specification.

Table No. 2. Specification of plot area used:

For option 1 – 6 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 (14.0877/6 farms with a capacity of up to 1 MW = approx. 2.348 ha (the exact area for each of 6 farms will be determined at the design stage following the selection of the option).	**23 480 m²**
Item 2 Photovoltaic modules (top view – average value assumed for a farm of up to 1 MW)	**approx. 6,000 m²**
Item 3 Table poles (for a farm of up to 1 MW)	**2 m²**
Item 4 Transformer station (for a farm of up to 1 MW)	**approx. 15 m²**
Total: excluding **item 1** and **item 2**	**approx. 17 m²**
BIOLOGICALLY ACTIVE AREA	**99,9%**
biologically active area under the modules Item 1- (Item 3 + Item 4)	**23 463 m²** **(2,3463 ha)**

For option 2 – 1 power plant with a capacity of up to 6 MW (sample table of the photovoltaic system area specification for 280 W panels):

GROSS COVERED AREA	
Item 1 Area planned for investment purposes (area for one farm with a capacity of up to 6 MW)	**140 877 m²**
Item 2 Photovoltaic panels (top view)	**approx. 36,000 m²**
Item 3 Table columns	**approx. 13 m²**
Item 4 Transformer stations (assumption – up to 6 stations of 15 m² each)	**approx. 90 m²**
Total: excluding **item 1** and **item 2**	**approx. 103 m²**
BIOLOGICALLY ACTIVE AREA	**99,9 %**
biologically active area under the modules Item 1- (Item 3 + Item 4)	**140 774 m²** **(14,0774 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.

"Reszel" photovoltaic park with a total capacity of up to 6 MW will be made of photovoltaic panels (polycrystalline, monocrystalline), which will be installed on the so-called "supporting 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 "Reszel" 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. 21,428 pcs. for a farm of up to 6 MW), the power plant will be built from the "tables" in the amount selected at the design stage taking into account, i.a., 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 "Reszel" photovoltaic park will be connected to the existing Reszel Main Power Supply Point in direct vicinity of the plots in question by means of MV-15 kV switching stations (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 the RSN-15 kV switching station at the border of the Main Power Supply Point on plots No. 37/7, 37/8 depending on the agreement of location with the Power System Operator.

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 the Reszel Main Power Supply Point to the plots 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 a decision is an adequate surface area of the plots allowing for construction of the "Reszel" photovoltaic park with a total capacity of up to 6 MW and the Reszel Main Power Supply Point in the direct vicinity of the plots, which enables direct connection of photovoltaic power plants constituting photovoltaic park to the power system. 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 route of MV-15 kV service lines will run along plots No. 37/7, 37/8 to RSN-15 kV (location of RSN-15kV at the design stage), so on 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 6 MW.

The indicated location of the "Reszel" photovoltaic park with a total capacity of up to 6 MW on plots No. 37/7, 37/8 – 0004 Dębnik in Dębnik was found to be the most advantageous and it is the option proposed by the applicant as the most reasonable 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 the "Reszel" photovoltaic park with a total capacity of up to 6 MW in Dębnik.

The investor has chosen to implement option II. This option involves the construction of the "Reszel" photovoltaic park with a total capacity of up to 6 MW on plots No. 37/7, 37/8 – 0004 in Dębnik, 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 construction of the "Reszel" photovoltaic park is not the additional electricity generation but reduction of flue gas emission from stacks of coal-fired 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 a photovoltaic system (solar power plant) solves, relating 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 the construction of the "Reszel" photovoltaic park with a total capacity of up to 6 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 the "Reszel" photovoltaic park with a total capacity of up to 6 MW in Dębnik on plots No. 37/7, 37/8 – 0004 Dębnik will provide 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 6 MW – about 6,500 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 project consisting in construction of the "Reszel" 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 Annex I of Directive 2009/147/EC of 30 November 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 plots intended for the 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 "Reszel" photovoltaic park, i.e. on plots No. 37/7, 37/8 – 0004 Dębnik in Dębnik, is composed of the following agricultural land classes:

- AGRICULTURAL LAND CLASS RIVa – 0.82 ha of the total investment project site area;
- AGRICULTURAL LAND CLASS RIVb – 11.49 ha of the total investment project site area;
- AGRICULTURAL LAND CLASS RV – 1.67 ha of the total investment project site area;
- AGRICULTURAL LAND CLASS N – 0.11 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 AMOUNTS OF SUBSTANCES OR ENERGY RELEASED INTO THE ENVIRONMENT USING ENVIRONMENTAL PROTECTION SOLUTIONS

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 "Reszel" photovoltaic park with a total capacity of up to 6 MW in Dębnik.

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 – agricultural areas;
- from the south – areas where the Reszel Main Power Supply Point is located;
- from the west – a public road (regional road), 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	**LAeq N** – reference time interval equal	**LAeq D** – reference time interval equal to 8 the least favorable	**LAeq N** – reference time interval equal to 1

		to 16 hours	to 8 hours	consecutive hours during the day	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 of children and youth c) Areas where social care houses are located d) Hospital areas in towns	55	50	50	40
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.

"Reszel" photovoltaic park will not comprise 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	0.48
2	15 01 01	Paper and cardboard packaging	0.48
3	15 01 02	Plastic packages	0.48
4	15 01 04	Metal packages	0.48
5	17 01 01	Concrete waste and concrete debris from demolitions and overhauls	6.72
6	17 01 82	Other unspecified construction waste	0.048
7	17 04 05	Iron and steel	5.4
8	17 04 11	Cables other than those referred to in 17 04 10	1.32
9	17 05 04	Soil and earth including stones, other than those referred to in 17 05 03	9.96
10	19 10 02	Non-ferrous metal waste	0.048
11	20 01 39	Plastic materials	0.48
12	20 03 04	Sludges from septic tanks used to collect liquid wastes	0.48
13	17 04 02	Aluminum	9
TOTAL			**40,776**

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 "Reszel" photovoltaic park with a total capacity of up to 6 MW in Dębnik will be located far from the national borders (the nearest border is the Polish-Russian border located about 35 km away from the project site), therefore there is no possibility of cross-border environmental impact of this 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 20), with the EU code PLGW700020, and in the area of the Homogeneous Surface Water Body (JCWP) with the code RW7000175848812. The designed "Reszel" 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 Jarft, Pregoła and Świeża 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 Homogeneous Surface Water Bodies is shown in Appendix **No. 11**, while the map of the area of the Homogeneous Groundwater Bodies where the project is to be located is shown in Appendix **No. 12**.

In the immediate vicinity of the planned photovoltaic park with a total capacity of up to 6 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. The nearest ecological corridor is located approximately 1 km west of the planned project.

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 "Reszel" photovoltaic park is not located within protected areas.

The area intended for the project is located approx. **5.5** km from the **"Polder Sątopy – Samulewo" Reserve** – one of the youngest in the Warmińsko-Mazurskie Voivodeship. This fauna reserve was established in 2009 and is located in the Bisztynek Municipality, in Bartoszyce District.

The reserve covers an area of 333.30 ha with a buffer zone of 793 ha around the following villages: Sątopy-Samulewo, Wojkowo, Grzęda, Pleśno, Pleśnik, Toniki Małe, Troksy and Nisko, approx. 6 km north-west of Reszel.

This area was previously protected as a local nature conservation site.

The aim of protection is the preservation of the floodplain at the fork of the Sajna and Ryn Rivers, being the breeding ground of numerous species of water and wetland birds and the place of bird concentration during autumn and spring migrations. The floodplain is surrounded mainly by an undulating moraine upland made mainly of boulder clays. The polder is the former Sajno Lake, which was drained for agricultural purposes in the 19th century and now, after abandoning intensive drainage, is filled with water again, creating a favorable resting place for numerous migratory birds. The polder is surrounded by farm fields.

The number of wetland birds during migration often exceeds 30,000 individuals. The common crane can be seen there, whose nesting site can gather up to 3,000 individuals during the migration season. In addition, there are migratory bird species such as: bean goose, greater white-fronted goose, graylag goose. Flocks of: mallard, wood warbler, common teal, black-headed gull, common pochard, tufted duck, ruff, goldeneye, curlew, common gull, mute swan, coot, Caspian gull, European golden plover, Lapwing, great cormorant and many other, often rare species make an impression.

In the entire north-eastern Poland there is no such large concentration of birds, hence the area is very valuable in ornithological terms.

The area of the planned project is located approx. **2 km** from the border of the **"Dolina Rzeki Guber"** Protected Landscape Area – established by virtue of Regulation No. 21 of the Warmińsko-Mazurskie Voivode of April 14, 2003 on the introduction of protected landscape areas in the Warmińsko-Mazurskie Voivodeship (Official Journal of the Warmińsko-Mazurskie Voivodeship of April 22, 2003 No. 52 item 725). The currently binding legal act is the Regulation of the Warmińsko-Mazurskie Voivode of December 19, 2008 on the "Dolina Rzeki Guber" Protected Landscape Area (Official Journal of the Warmińsko-Mazurskie Voivodeship No. 198 item 3108). The "Dolina Rzeki Guber" Protected Landscape Area is located in the Warmińsko-Mazurskie Voivodeship, in the Bartoszyce District (within the Sępopol and Bisztynek Municipalities), Kętrzyn District (within the Korsze, Barciany, Reszel, Kętrzyn Municipalities and the city of Kętrzyn), Giżycko District (in the Ryn Municipality) and Olszyny District (in the Kolno Municipality). It covers an area of 14363.8 ha west of the "Kraina Wielkich Jezior Mazurskich" Protected Landscape Area and north of the "Krzyżany" Protected Landscape Area.

The planned project is located about **4.5** km from the border of the **"Jeziora Legińsko-Mrągowskie" Protected Landscape Area** – with an area of 20,615.9 ha, in the Warmińsko-Mazurskie Voivodeship, in the Kętrzyn District, in the Reszel Municipality, in the Mrągowo District in the area of Sorkwity, Mrągowo Municipalities and the city of Mrągowo and in the Olsztyn District in the Kolno and Biskupiec Municipalities.

14.2. Impact on NATURA 2000 site:

At a distance of approx. **15** km from the area where the "Reszel" photovoltaic park with a total

capacity of up to 6 MW is planned, the **"Ostoja Warmińska" Natura 2000** site is located.

Area code:

PLB280015

Area:

145341.99 ha

Characteristics of the area:

The "Ostoja Warmińska" Natura 2000 site is a potential refuge of the "Shadow List", included in 2006 in the official governmental proposal and included in 2007 in the draft new regulation of the Minister of Environment on areas of special protection of birds. The area is located in the northern part of the Warmińsko-Mazurskie Voivodeship and stretches along a strip of about 115 km long and 10-20 km wide along the state border with the Kaliningrad Oblast of the Russian Federation. In the east the area reaches the Oświn Lake, in the west – the valleys of the small Gołuba River, a tributary of the Banówka River. The central and eastern part of the area lies in the Staropruska Lowland, encompassing two mesoregions: the Sępopolska Plain and the Górowskie Hills. More than half of the area is located on the Sępopolska Plain. The plain is a vast and largely deforested basin, and comprises no lakes. The minor relief features between its central part and the banks are 40-50 m. The Łyna River flows through the middle of the Sępopolska Plain and spills into an elongated dam lake near the state border. Other major watercourses crossing the Sępopolska Plain within the refuge boundaries are the Mazurski Channel and the tributaries of the Łyna River: Omęt, Guber and Elma. The only major natural lakes in the refuge area are the Kinkajmskie and Arklickie Lakes. In addition, there are dozens of small lakes with an area greater than 1 hectare and fish ponds – the characteristic feature of this mesoregion is the occurrence of fat red silts in the lower parts of the area. The higher-lying areas and small hills are made up of glacial clays.

The characteristic soils in this part of the country are podsolic soils, which account for 68%. Brown soils comprise 17% and bog soils comprise 9%. The remainder is made up of black soils and alluvial soils. The Górowskie Hills are a moraine pedestal surrounded by depressions, with the culmination of the Zamkowa Mountain (216 m a.s.l.). The minor relief features here exceed 100 m. The area is strongly undulated, mostly forested and crossed by numerous streams flowing in valleys between the hills. The largest watercourse is the Wałsza River, which begins here. The area is largely forested, and there are several lakes, the largest of which is the Głębockie Lake. There are more than a dozen ponds in the forests of the Górowskie Hills. The western part of the area is located within the Gdańskie Coastland and covers a small fragment of the Warmińska Lowland mesoregion, with a character resembling that of the Sępopolska Lowland and a low altitude. There are no lakes, and the largest watercourses in this part of the area are the Banówka and Omaza Rivers. The climate of this part of Poland is different from that of other parts of the country. The average annual temperature in the area is 7 degrees C, which is 2-3 degrees lower than the temperature in the rest of the country. The annual total amount of precipitation is approx. 600 mm. Forests cover a total of approx. 25% of the refuge area. These are mostly well-preserved fragments of broadleaved forests, with parts of old-growth forests with tree stand of 100 years or older. Along small watercourses there are alder or alder-ash riparian forests with well-preserved species structure. Noteworthy are also complexes of marshy forests and marshy birches, as well as numerous peat bogs which are valuable habitats of protected (on a national scale) plant species. Despite the small number of lakes, there are many mid-field and mid-forest boggy areas in the refuge, supporting biodiversity. The area is characterized by a low population density and is steadily depopulating. Within its borders there is only one small town – Sępopol, while on the edges of the refuge there are two other towns: Bartoszyce and Górowo Iławeckie. Less than 10-15 years ago, State-owned Agricultural Farms (PGR) were functioning in most of the farm fields in this region. The remainder was developed by small individual farms of less than 10-15 ha. After the decommissioning of State-owned Agricultural Farms, idle lands formed in the areas covered by them, which in the first few years were attractive feeding grounds for storks. Nowadays, in some of these areas (especially in the Sępopolska Lowland) large-scale farms have begun to appear, focused on one type of production. This results in development of monocultures with large areas. Some of the former farmland areas were taken over by the State Forests, which carried out a large-scale afforestation campaign, especially in areas adjacent to the state border. As a result thereof, in many areas of once open or mosaic landscapes, agricultural or forest monocultures are formed, leading to the loss of some valuable habitats and consequently to a

reduction in the landscape and species diversity of these areas.

Quality and significance:

The "Ostoja Warmińska" refuge was proposed as a Natura 2000 site primarily for the protection of one species – the white stork, whose number and density are the highest in the country. However, it is also a very important refuge for many other bird species, since as many as 93 species of birds found on the Natura 2000 site (including 81 breeding and probably breeding species) can be found here. 38 species included in Annex I of the Birds Directive and 15 species included in the Polish Red Data Book of Animals are among them.

The most valuable avifauna values of the "Ostoja Warmińska" refuge are:

- the most numerous local population of white stork in Poland, numbering about 1000 couples, with the highest density in the country of 71 couples per 100 km^2,
- a large breeding population of two other species rare in the country – the lesser spotted eagle and the common crane,
- confirmed nesting of two extremely rare species in the country: short-toed snake eagle and whooper swan,
- nesting of other species rare in the country: great bittern, black stork, common goldeneye, white-tailed eagle, hen harrier, Eurasian eagle-owl, little crake, white-backed woodpecker and bearded reeding.
- possible nesting of the extremely rare greater spotted eagle.
- possible nesting of other very rare species: ferruginous duck, greylag goose, red kite, black kite, osprey, spotted crake, Ural owl, boreal owl, curlew, marsh tern, Eurasian three-toed woodpecker and Syrian woodpecker,
- nesting of locally rare species such as black-necked grebe, black-tailed godwit and hoopoe,
- quite numerous breeding population of such valuating species as corncrake, quail and red-backed shrike.

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, NATURAL AND CONSTRUCTION DISASTERS

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 "Reszel" 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.

The risk of a natural disaster is not possible as the materials used in the construction of photovoltaic power plants are not of a nature to adversely affect the environment. The only equipment that poses a hazard is the oil transformer in the transformer station, which, however, is equipped with a leak-tight oil bund to prevent leakage of the aforementioned oil into the ground in the event of failure, in accordance with the technical approval of the transformer manufacturer.

The risk of a construction disaster does not exist in the photovoltaic park in question due to the nature of development, i.e. the maximum height of the structure for photovoltaic panels is 3 meters and the static system is simple, classified as 1 geotechnical category.

16. DEMOLITION WORKS CONCERNING PROJECTS THAT MAY HAVE A SIGNIFICANT IMPACT ON THE ENVIRONMENT – WITH CONSIDERATION GIVEN TO THE AVAILABLE RESULTS OF OTHER ENVIRONMENTAL IMPACT ASSESSMENTS CARRIED OUT UNDER SEPARATE REGULATIONS.

At the demolition stage, impacts will be similar to those at the project (construction) stage. Potential impacts occurring in the area of the planned project will be associated mainly with increased vehicle traffic and operation of construction machinery during disassembly of the photovoltaic power plant and elements of the technical infrastructure.

Once the works are complete, these impacts will disappear. No impacts on material and cultural assets are anticipated in the project area.

17. CONCLUSIONS

1. The subject of the document is the Information Sheet for the project involving the construction of the "Reszel" photovoltaic park (solar power plants) with a total capacity of up to 6 MW in Dębnik, Reszel Municipality, Kętrzyn District, Warmińsko-Mazurskie 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 **plots No. 37/7, 37/8 – cadastral district 0004 Dębnik in Dębnik, Reszel 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 62a and Article 63 point 1 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.

18. APPENDICES

Appendix No. 1 – Map with the location of the plot intended for the project along with the development concept for the "Reszel" 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 Reszel Municipality for the area covered by the application;

Appendix No. 5 – Photos of a sample 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;

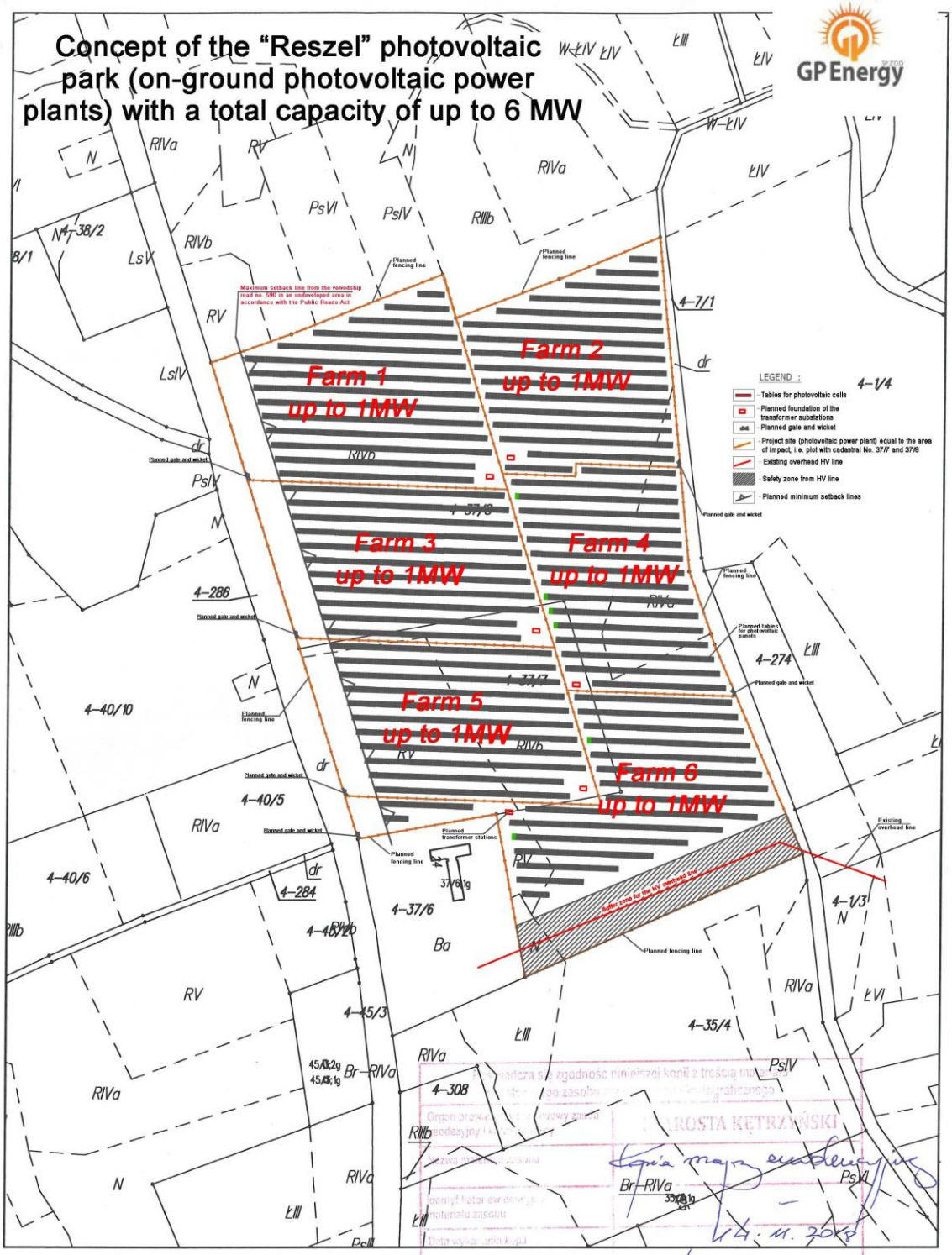
Appendix No. 9 – Sample transformer station;

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

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

Appendix No. 12 – Sheet of the area of Homogeneous Groundwater Bodies where the planned project is located;

Concept of the "Reszel" photovoltaic park (on-ground photovoltaic power plants) with a total capacity of up to 6 MW



Dębnik Cadastral District

Scale 1:5000

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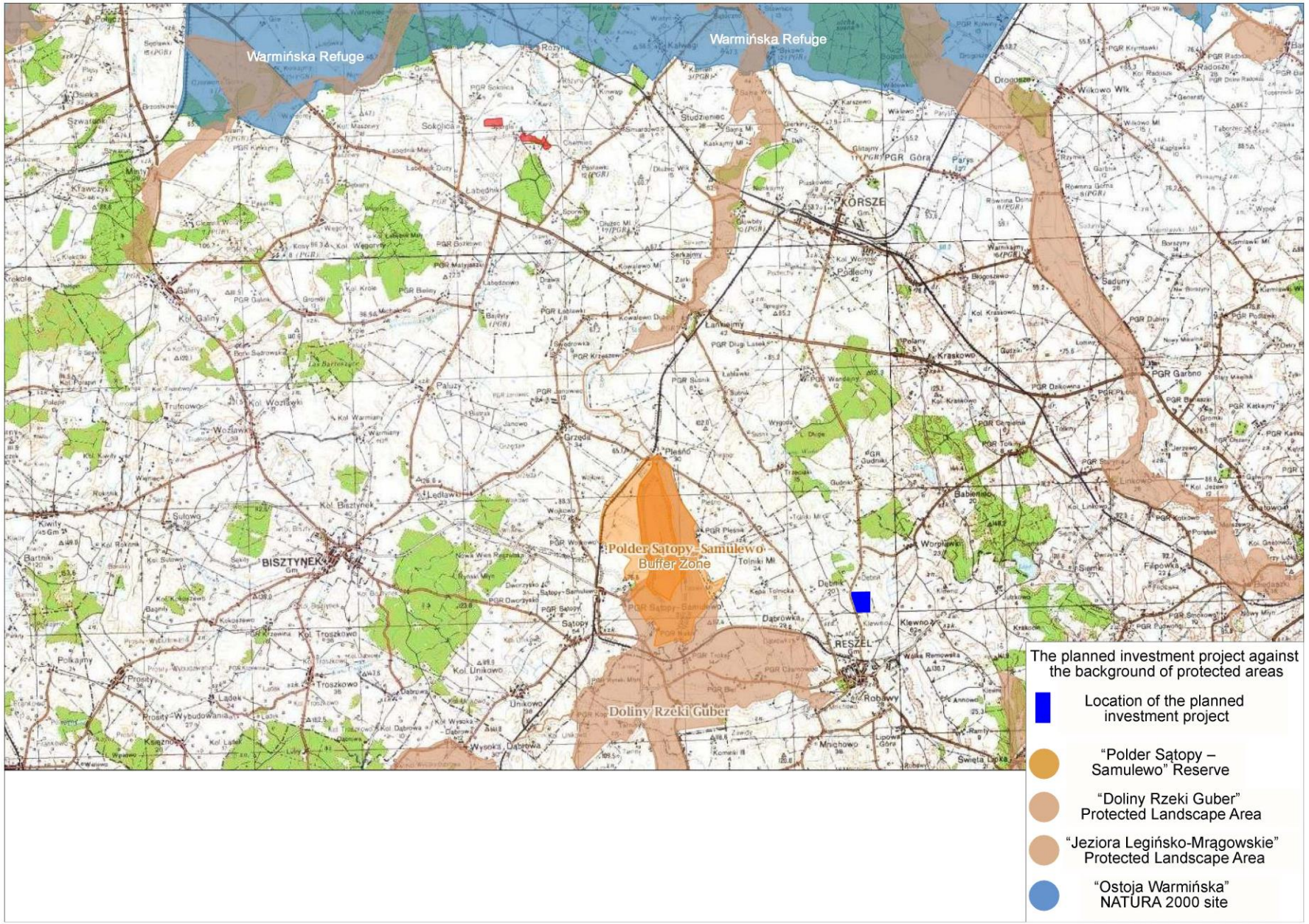
14.11.2018


Warmińska Refuge
Warmińska Refuge
Polder Sątopy–Samulewo
Buffer Zone
Doliny Rzeki Guber
BISZTYNEK
KORSZE
RESZEL
The planned investment project against the background of protected areas
Location of the planned investment project
"Polder Sątopy – Samulewo" Reserve
"Doliny Rzeki Guber" Protected Landscape Area
"Jeziora Legińsko-Mrągowskie" Protected Landscape Area
"Ostoja Warmińska" NATURA 2000 site

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

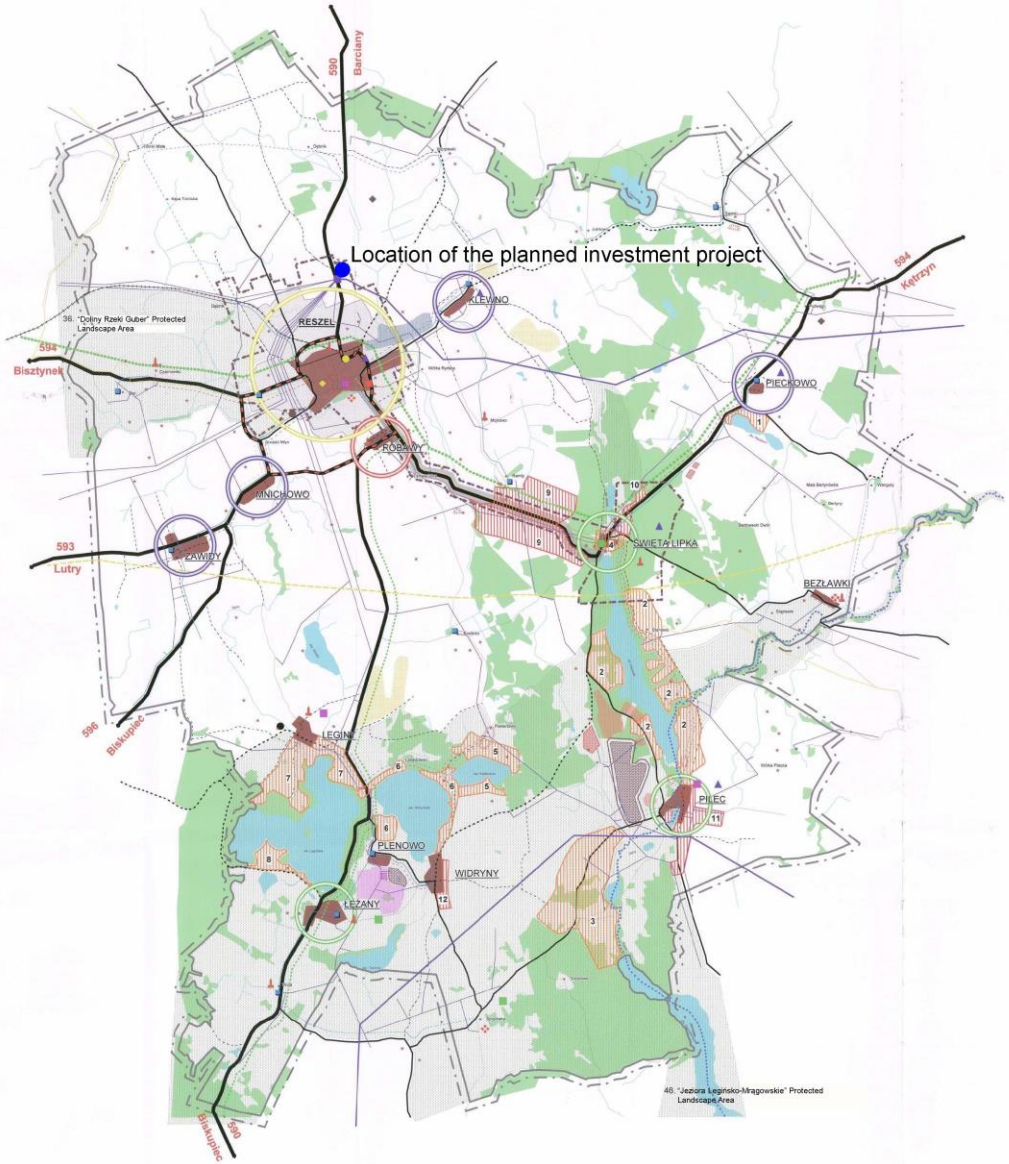
RESZEL MUNICIPALITY

STUDY OF CONDITIONS AND DIRECTIONS OF SPATIAL DEVELOPMENT

DIRECTIONS OF SPATIAL DEVELOPMENT

FIG. NO. 1

SKALA 1: 25,000



SYMBOLS:

DIRECTIONS OF DEVELOPMENT AND USE OF LAND:

- RESZEL (EXCLUDED FOR A SEPARATE STUDY)
- WATER
- FORESTS
- MUNICIPALITY BOUNDARY
- DEVELOPED AREAS OF RURAL SETTLEMENT UNITS, RECOMMENDED FOR TRANSFORMATION AND ADDITION OF BUILDINGS FOR RESIDENTIAL FUNCTIONS AND AGRICULTURAL AND NON-AGRICULTURAL BUSINESS ACTIVITY
- AREAS DESIGNATED FOR DEVELOPMENT FOR THE PURPOSES OF TOURIST AND LEISURE FUNCTIONS AND TOURIST TRAFFIC SERVICES
- AREAS DESIGNATED FOR DEVELOPMENT FOR RESIDENTIAL FUNCTIONS AND NON-AGRICULTURAL BUSINESS ACTIVITY
- AREAS OF AGRICULTURAL PRODUCTION SPACE, AGRICULTURAL BUSINESS ACTIVITY AND AFFORESTATION
- DESIGNED WATER BASIN

CENTERS OF BUSINESS AND SETTLEMENT ACTIVITY

- MAIN CENTER OF CONCENTRATION OF RESIDENTIAL, BUSINESS, SOCIAL AND CULTURAL FUNCTIONS IN THE MUNICIPALITY
- CENTERS OF CONCENTRATION OF SETTLEMENT, AGRICULTURAL AND NON-AGRICULTURAL BUSINESS FUNCTIONS IN THE IMMEDIATE VICINITY OF RESZEL
- CENTERS OF CONCENTRATION OF SETTLEMENT, AGRICULTURAL AND NON-AGRICULTURAL BUSINESS FUNCTIONS IN THE SURROUNDINGS OF TOURIST AND RECREATION AREAS
- CENTERS OF CONCENTRATION OF SETTLEMENT AND NON-AGRICULTURAL BUSINESS FUNCTIONS IN THE SURROUNDINGS OF AGRICULTURAL ECONOMY
- AREA OF THE PREPARED LOCAL DEVELOPMENT PLAN FOR RESZEL, ŚWIĘTA LIPKA VILLAGE and THE PILGRIMAGE ROUTE BETWEEN RESZEL and ŚW. LIPKA.

CIRCULATION SYSTEM

- EXISTING REGIONAL ROADS
- PLANNED SECTIONS OF CONSTRUCTION AND MODERNIZATION OF REGIONAL ROADS
- DISTRICT PAVED ROADS
- DISTRICT ROADS TO BE PAVED
- MUNICIPAL PAVED ROADS
- MUNICIPAL GRAVEL ROADS
- RAILWAY LINE

BIKE LANES

- INTERNATIONAL
- INTERREGIONAL
- KAYAKING ROUTE
- PILGRIMAGE ROUTE

MAIN EXISTING AND PLANNED ELEMENTS OF TECHNICAL INFRASTRUCTURE

- EXISTING WATER INTAKES
- EXISTING WATER SUPPLY SYSTEM
- DESIGNED WATER SUPPLY SYSTEM (INDICATIVE ROUTE)
- EXISTING SANITARY SEWERAGE NETWORK
- DESIGNED SANITARY SEWERAGE NETWORK
- EXISTING MEDIUM AND HIGH PRESSURE GAS PIPELINES
- GAS EXPORT CONCEPT (INDICATIVE LOCATION)
- MUNICIPAL AND COMMUNAL LANDFILLS
- EXISTING WASTEWATER TREATMENT PLANT
- DESIGNED WASTEWATER TREATMENT PLANT
- REZSEL MAIN POWER SUPPLY POINT
- 15 kV MV LINES
- 110 kV HV LINE

AREAS AND OBJECTS OF NATURAL ENVIRONMENT UNDER LEGAL PROTECTION

- PROTECTED LANDSCAPE AREAS
- MONUMENTS OF NATURE

LEGALLY PROTECTED CULTURAL ASSETS AND THEIR PROTECTION ZONES

- HISTORIC BUILDINGS ENTERED IN THE REGISTER OF HISTORIC BUILDINGS
- HISTORIC BUILDINGS ENTERED IN THE REGISTER OF ARCHAEOLOGICAL MONUMENTS
- ARCHAEOLOGICAL SITES

LOCAL ENVIRONMENTAL VALUES

- NATURAL AGGREGATE DEPOSITS COVERED BY A LICENSE ALLOWING FOR MINING
- DEPOSITS OF CLAY RAW MATERIALS FOR CERAMIC BUILDING MATERIALS COVERED BY A LICENSE ALLOWING FOR MINING
- DEPOSITS OF NATURAL AGGREGATE NOT COVERED BY MINING LICENSE
- DEPOSITS OF CLAY RAW MATERIALS FOR CERAMIC BUILDING MATERIALS NOT COVERED BY MINING LICENSE
- AREAS OF EXPECTED PRESENCE OF NATURAL AGGREGATE DEPOSITS
- RECLAMATION AREA OF POST-MINING MINERAL DEPOSITS

ENVIRONMENTAL HAZARDS

- POST-MINING MINERAL AREAS THAT REQUIRE RECLAMATION
- ONEROUS ENVIRONMENTAL IMPACT DEVICES

PUBLIC SERVICE FACILITIES

- ELEMENTARY SCHOOLS
- LOWER SECONDARY SCHOOLS
- PRIMARY HEALTH CARE
- MUNICIPAL CULTURE CENTER
- LIBRARIES

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.

DISTRICT STAROSTY IN KĘTRZYN
Plac Grunwaldzki 1
11-400 Kętrzyn

Province: **Warmińsko-Mazurskie**
District: **Kętrzyn**
Cadastral unit: **280805_5 Reszel – rural area**
Cadastral district: **0004 DĘBNIK**

SIMPLIFIED EXTRACT FROM THE LAND REGISTER
dated: November 14, 2018

Registry Unit: **G.104** Register No: *GKN-E.6621.1.1742.2018*

No.	Cadastral entity	Nature of ownership and possession	Share
1	BOŻENA PIĄTEK Parents: TADEUSZ, HENRYKA UL. ŚWIERKOWA 11; 18-400 ŁOMŻA;	Ownership	1/2
2	IZABELA SEKŚCIŃSKA Parents:KAZIMIERZ, IRENA UL. WIOSENNA 25D; 18-400 ŁOMŻA;	Ownership	1/2

Plot No.	Sheet	Plot location	Description of land use	Classification of land use and classification contours	Land use area [ha]	Plot area [ha]	Land and mortgage register No. or other document to confirm ownership
37/7	3	DĘBNIK	arable land	RIVb	1.4952	2.9877	OL1K/00029598/6
			arable land	RV	1.4925		
Plot Id: **280805_5.0004.37/7** Land value: Statistical division: 545030							
37/8	3	DĘBNIK	wastelands	N	0.11	11.10	OL1K/00029598/6
			arable land	RIVa	0.82		
			arable land	RIVb	9.99		
			arable land	RV	0.18		
Plot Id: **280805_5.0004.37/8** Land value: Statistical division: 545030							

Total plot area: 14.0877 ha

Say: fourteen hectares eight hundred and seventy-seven square meters

The copy contains data as of: November 14, 2018

DISTRICT STAROSTY IN KĘTRZYN

November 14, 2018

Per procura of the Kętrzyn District Governor
Agnieszka Kozłowska
INSPECTOR
in the Department of Geodesy, Cartography, Cadaster and Real Property

……..

(first and last name of the person representing the authority)

Prepared by: Agnieszka Kozłowska

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 1/4 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

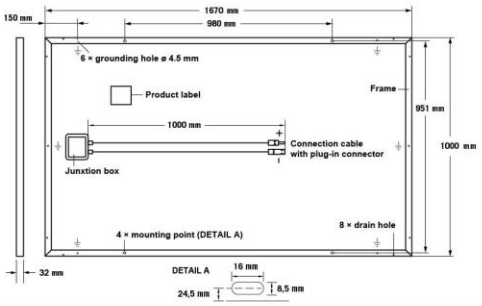
Commercial and industrial overhead systems

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

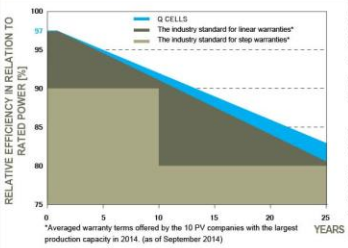


ELECTRICAL FEATURES

RATINGS OF THE OPERATION				270	275	280
MINIMUM EFFICIENCY UNDER STANDARD TEST CONDITIONS, STC[1] (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] 11000 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

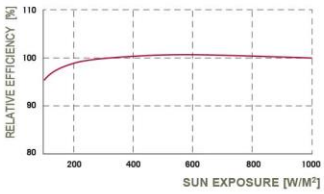
PERFORMANCE WARRANTY Q CELLS



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 | FAKS +49 (0)3494 66 99-23000 | E-MAIL 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)

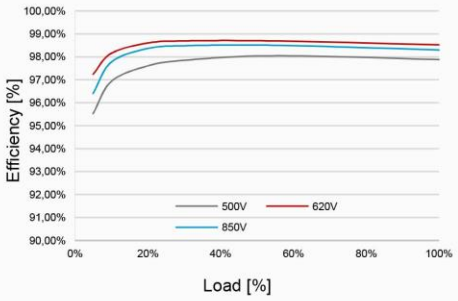
Operational

- Max. efficiency 98.6%, European efficiency 98.3%

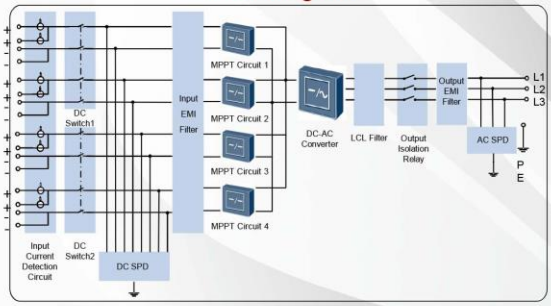
Reliable

- 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

www.huawei.com/solar

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	Type II
AC overvoltage protection	Type II
Insulation monitoring	Yes
Residual current detection	Yes
	Circulation
Display	LED indicators
USB and 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

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

MRw-bpp 15/1000-3 /3P

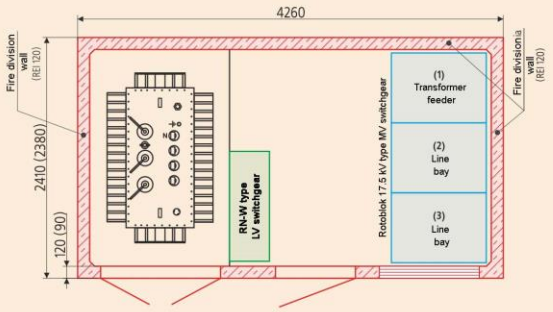
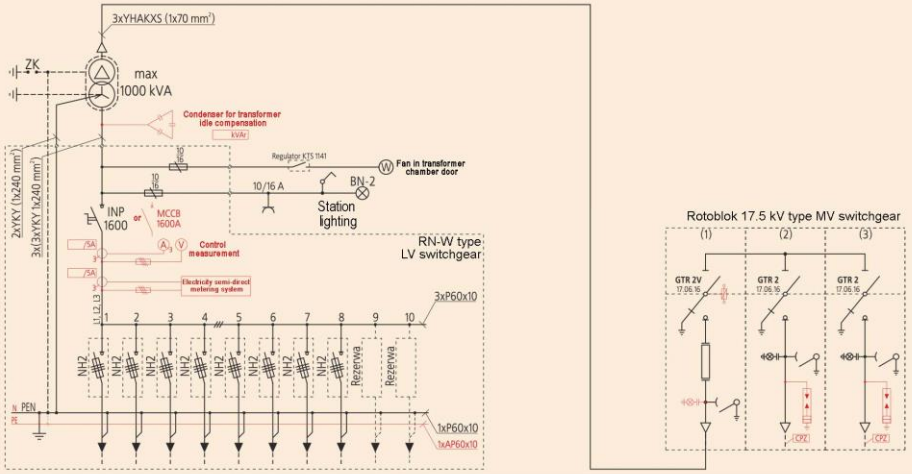
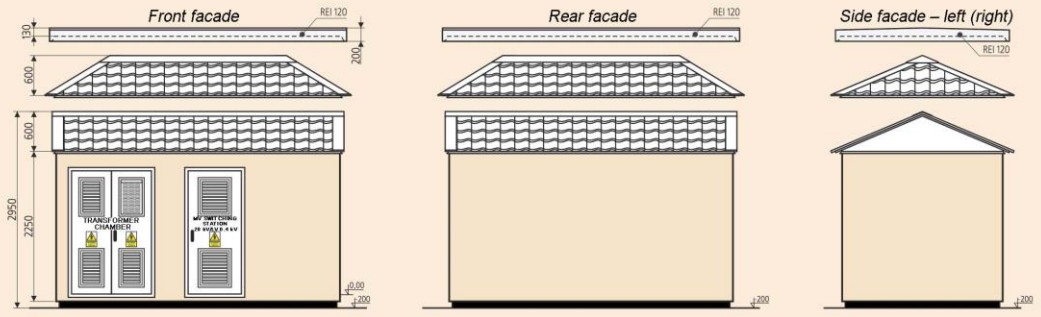


Diagram of standard station type MRw-bpp 15/1000-3/3P



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

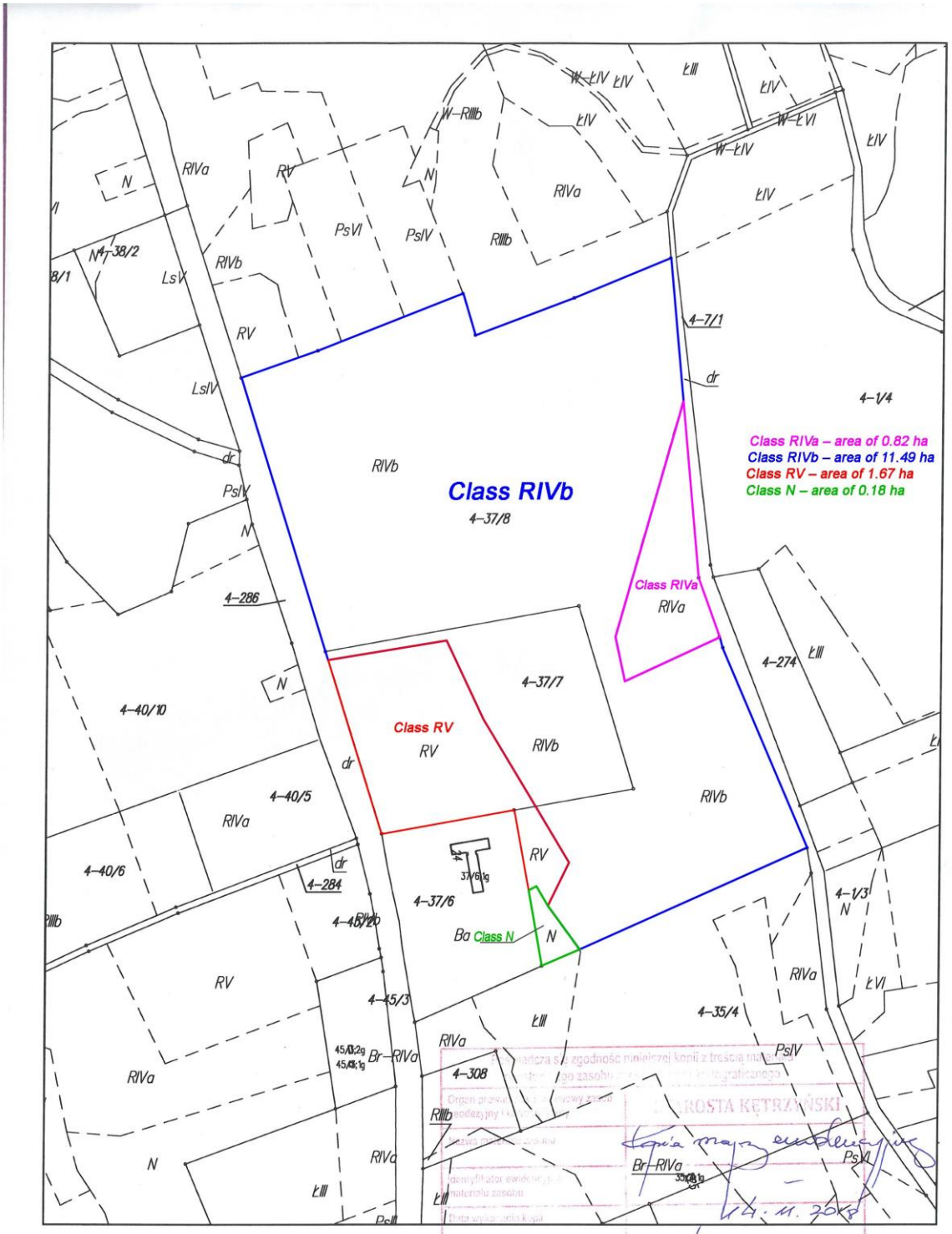


Weight:

- 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



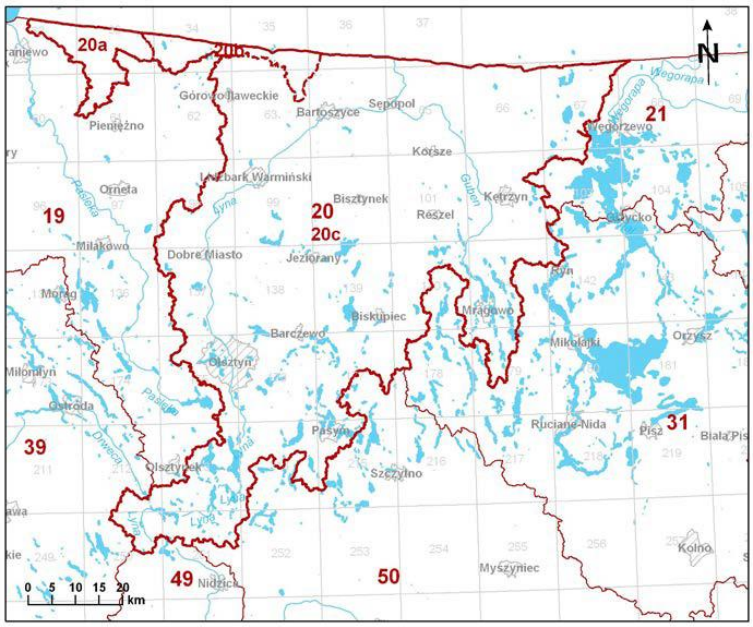
Dębnik Cadastral District

Scale 1:5000

GK-O.6642.1.1701.2018

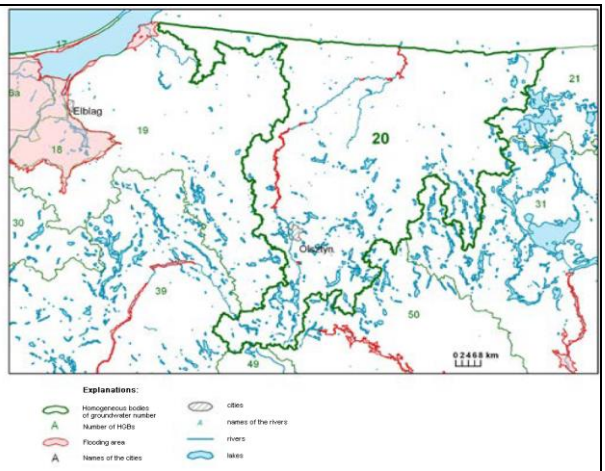

Plots intended for the location of the planned project
CEL ST. IL.
good quantitative status
Agricultural
land
Risk
not threatened
Area of the Homogeneous Groundwater Body [km2]
6089.30
RZGW
Regional Water Management Authority in Warsaw
National homogeneous surface water body code
RW7000175848812
Water body category (CW – Coastal. TW – Transitional, RW – River, LW – Lake, S – Sea):
RW
Remarks
Homogeneous Surface Water Body catchment of the river basin
Catchment area [km2]
14.45

Number of Homogeneous Groundwater Body: 20	**Area of Homogeneous Groundwater Body [km²]:** 6089.3	
EU ID:	PLGW700020	
Administrative location		
Voivodeship	District	Communes
Warmińsko-Mazurskie	braniewski	Braniewo, Płoskinia, Pieniężno – rural area, Lelkowo
	bartoszycki	Górowo Iławeckie, Górowo Iławeckie (urban municipality), Bartoszyce, Bartoszyce (urban municipality), Sępopol (rural area), Sępopol (town), Bisztynek (rural area), Bisztynek (town)
	kętrzyński	Barciany, Srokowo, Korsze (rural area), Korsze (town), Reszel (rural area), Reszel (town), Kętrzyn, Kętrzyn (urban municipality), Lubomino (rural municipality)
	węgorzewski	Węgorzewo (rural area), Budry
	lidzbarski	Lidzbark Warmiński, Lidzbark Warmiński (urban municipality), Kiwity
	giżycki	Ryn (rural area)
	mrągowski	Mrągowo, Mrągowo (urban municipality), Sorkwity, Piecki, Mikołajki (urban and rural municipality)
	szczycieński	Dźwierzuty, Pasym (rural area), Pasym (town), Jedwabno
	olsztyński	Świątki, Dobre Miasto (rural area), Dobre Miasto (town), Jeziorany (rural area), Jeziorany (town), Kolno, Biskupiec (rural area), Biskupiec (town), Jonkowo, Dywity, Barczewo (rural area), Barczewo (town), Gietrzwałd, M. Olsztyn, Stawiguda, Purda, Olsztynek (rural area)
	ostródzki	Grunwald, Dąbrówno
	nidzicki	Nidzica (rural area), Kozłowo
	Olsztyn	Olsztyn
Geographic coordinates	19°49'03.7456" - 21°47'38.4409" 53°25'22.6620" - 54°24'34.5488"	

Map with the location of HGBs		
		
Within Homogeneous Groundwater Body No. 20, sub-parts have been distinguished according to the course of the river basins (20a – Jarft River, 20b – Świeża River and 20c – Pregoła River)		
Geographical location		
Physical and geographical region (Kondracki, 2009)	Province: Eastern Baltic-Belarusian Plain (84)	
	Subprovince: Wschodniobałtyckie Coastland (841)	
	Macroregion: Staropruska Plain (841.5)	Mesoregions: Górowskie Hills (841.57) Sępopolska Plain (841.59)
	Macroregion: Mazurskie Lakeland (842.8)	Mesoregions: Olsztyńskie Lakeland (842.81) Mrągowskie Lakeland (842.82) Masurian Lakeland (842.83) Węgorapy Land (842.84)
	Province: Central European Plain (31)	
	Subprovince: Południowobałtyckie Lakeland (314-316)	
	Macroregion: Chełmińsko-Dobrzyńskie Lakeland (315.1)	Mesoregions: Lubawski Hummock (315.15)
Hydrological and hydrogeological location		
River Basin	Jarft, Pregoła, Świeża Rivers	
Water region RZGW	Łyna, Węgorapa Regional Water Management Authority Warsaw	
Main catchment areas within Homogeneous Groundwater Body (catchment area order)	Banówka (I), Łyna (II)	

Balance area		Z-20 Łyna; Z-22 Bezleda, Stradyk; Z-24 Banówka			
Hydrogeological region (Paczyński, 1995)		III – Mazury			
Site development (source: Corin Land Cover layer)					
% of anthropogenic areas		1.85			
% of agricultural areas		67.92			
% of forest and green areas		26.94			
% of wetlands		0.38			
% of water areas		2.91			
HYDROGEOLOGY					
Number of aquifers		2			
Aquifer characteristics (from the ground surface)					
Quaternary aquifer	Level: Q_1	**Stratigraphy**	**Lithology**	**Aquifer characteristics**	
		Q (quaternary)	sands, gravels, pebbles	pore	
		Nature of the water table	**Depth of aquifers of the level;** from – to [m]		
		Free (locally confined)	0-40		
		Hydrogeological parameters of the aquifer			
		thickness from – to	filtration coefficient from – to	conductivity	drainage capacity / medium resilient capacity
		[m]	[m/h]	[m^2/h]	
		< 50 (on average 20)	0.148-1.944	0.8-35	-
	Level Q_2	**Stratigraphy**	**Lithology**	**Aquifer characteristics**	
		Q (quaternary)	Sands, gravels	pore	
		Nature of the water table	**Depth of aquifers of the level;** from – to [m]		
		confined, partly free	few – 80		
		Hydrogeological parameters of the aquifer			
		thickness from – to	filtration coefficient from – to	conductivity	drainage capacity / medium resilient capacity
		[m]	[m/h]	[m^2/h]	
		< 50	0.09-1.624	2.9-18	-
	Level Q_3	**Stratigraphy**	**Lithology**	**Aquifer characteristics**	
		Q (quaternary)	sands, gravels	pore	
		Nature of the water	**Depth of aquifers of the level; from – to [m]**		

		table			
		confined	50-150		
		Hydrogeological parameters of the aquifer			
		thickness from – to	filtration coefficient from – to	conductivity	drainage capacity / medium resilient capacity
		[m]	[m/h]	[m2/h]	
		< 30	0.016-0.863	1.25-7.5	-
		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**	
		Paleogene-Neogene (Miocene-Oligocene)	sands, gravels	pore	
		Nature of the water table	**Depth of aquifers of the level;** from – to [m]		
		confined	50-265		
		Hydrogeological parameters of the aquifer			
		thickness from – to	filtration coefficient from – to	conductivity	drainage capacity / medium resilient capacity
		[m]	[m/h]	[m2/h]	
		< 60	0.014-0.112 (mostly 0.2-0.3)	0.8-12	-
		Groundwater chemical types (natural/different from natural types)			
		Natural types: HCO_3-Ca (bicarbonate-calcium waters),			
Risk of drought (source: Institute of Meteorology and Water Management)			Number of low water levels (hydrological droughts) from 1951 to 2000: <7 – in the western part 8-15 – in the eastern part		

Risk of flooding (source: Map of areas at risk of flooding, 2007)	

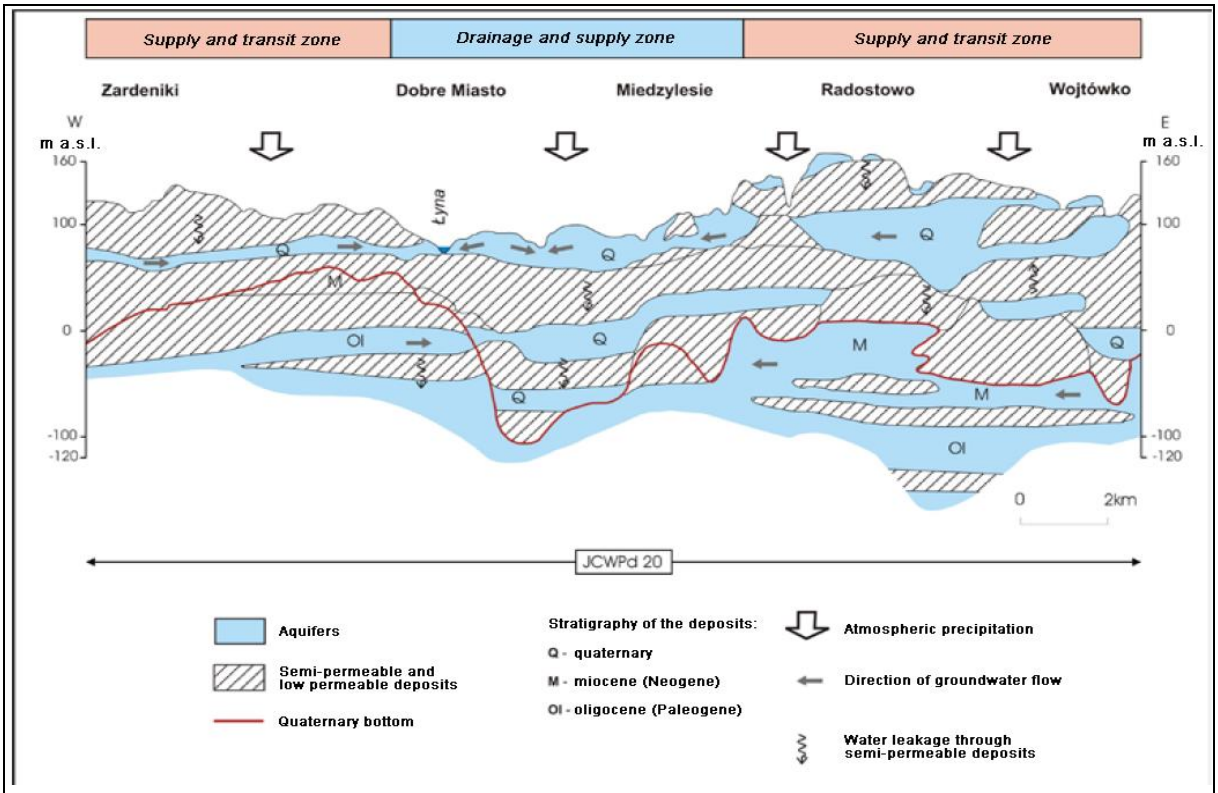
Groundwater flow system

The **Q1** level is supplied by infiltration of rainwater in watershed zones, even within lower order watersheds. Groundwater flows towards larger rivers because surface watercourses are the main base of groundwater drainage. Local groundwater flow systems are determined by the tributaries of the Łyna River. The presence of a significant number of lakes in the area means that groundwater flow is also forced by the draining nature of the largest lakes. In the case of this shallow level, as well as other deeper levels, the possibility of underground inflow from outside the unit boundary, from the north, should also be considered, as in this area the unit area is closed by the state border with Russia, which is not a natural boundary of the unit. This is the case in the Pregoła River basin, but the unit still includes fragments of the Jarft River basin and the Świeża River basin (north-western part of Homogeneous Groundwater Body No. 20). In these areas, groundwater flows in the north-western direction.

The **Q2** level is mainly supplied by water leakage through the Q1/Q2 separating level. Hydrogeologic windows also play an important role in supplying this level. In the northern part of Homogeneous Groundwater Body No. 20, where the Q1 level does not occur, the supply also occurs by infiltration. The water flows generally northward towards the main drainage base, the Pregoła River valley, which drains the unit area through the Łyna River. In the Łyna River valleys and its larger tributaries the ordinates of the water table are usually higher than those of the Q1 level, which indicates that these valleys participate in the drainage of the Q2 level, and leakage through the isolating level occurs upwards.

The **Q3** level is mainly supplied by leakage of waters through the impermeable formations of the Q2/Q3 isolation level. This level is best documented in the northern part of the unit, where the basic flow direction coincides with that of the Q2 level, and the pressure system in the Łyna River valley indicates that water from the Q3 level leaks into the upper levels.

The **Pg-Ng** level does not maintain continuity within the entire unit, moreover, it shows significant variation in terms of depth of occurrence, thickness of layers, their lithology and age. In addition, it was drilled with only a few holes, usually structural ones. As a whole, this makes the bottom of the Pg-Ng level not accurately recognized within the entire unit. In places where it is possible (mainly in the northern part of the unit), it has been found that this level is supplied by leakage through the impermeable formations of the Q3/Pg-Ng isolating level, and the Łyna River is its drainage base, similarly as the shallower quaternary levels.



Surface water ecosystems and terrestrial ecosystems dependent on groundwater	
Share of groundwater power supply in the total outflow of rivers within HGBs	52%
Groundwater-dependent terrestrial ecosystems (source: GIS layer)	Boggy lands (11 % 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

Nature reserves:

Martwe Lake
Kałeckie Błota
Peninsula and islands on Rydzewskie Lake
Żegockie Boggy Land
Ustnik
Bajory
Redykajny
Mszar
Zabrodzie
Gązwa
Bukowy
Dębowo
Professor Roman Kobendza Springs of Łyna River
Siedmiu Wysp Lake
Orłowo Małe Lake
Nadrowskie Peat Bogs
Kwiecewo
Polder Sątopy-Samulewo
Kośno Lake
Warmiński Forest

Natura 2000 network – special habitat protection areas:

PLH280004	Mamerki
PLH280002	Gierłoż
PLH280011	Gązwa
PLH280039	Jonkowo-Warkały
PLH280052	Napiwodzko-Ramucka Refuge
PLH280045	Północnomazurska Refuge
PLH280040	Kaszuny
PLH280046	Swajnie
PLH280047	Spring peat bogs near Łabędnik
PLH280033	Warmińskie Beeches
PLH280044	Refuge at Oświn
PLH280006	Pasłęka River
PLH280055	Baranowo Pond Turtle Refuge
PLH280048	Pisz Refuge

Natura 2000 network – special birds protection areas:

PLB280012	Dobskie Lake
PLB280004	Oświn Lake and surroundings
PLB280007	Puszcza Napiwodzko-Ramucka (Napiwoda-Ramuki Forest)
PLB280008	Piska Forest
PLB280015	Warmińska Refuge

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 – local	
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	30847.22	
from mine drainage	-	
Groundwater resources available for development [m^3/d]		
resources	1 048 000	
% of resource utilization	8.1	
Area of pollution sources		
Areas particularly vulnerable to pollution by nitrates of agricultural origin (source: GIS layer – OSN (Areas Particularly Vulnerable))	OSN (Areas Particularly Vulnerable) in the drainage basin of the Guber River and its tributaries (Regulation No. 12/2012 of the Director of the Regional Water Management Authority of September 10, 2012)	
Urban areas	Cities with the number of inhabitants from 10 to 50 thousand	Dobre Miasto, Biskupiec, Lidzbark Warmiński, Mrągowo, Bartoszyce, Kętrzyn

	Cities with the number of inhabitants from 50 to 200 thousand	Olsztyn
	Cities with a population over 200,000	-

Assessment of the status of Homogeneous Groundwater Bodies 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	-