FLOATING PHOTOVOLTAIC POWER PLANT DRUŽMIRJE

Design solutions for project documentation development – Developed Concept design for FPV Družmirje

- project brief –



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1. Introduction

The HSE Group is the leading producer of electricity from renewable energy sources in Slovenia. In addition to hydropower generation, the Group aims to expand its activities to other renewable energy sources, including solar, geothermal and wind energy, as well as combined heat and power generation.

The spatial planning process for a large floating photovoltaic power plant is currently underway on a degraded area within the mining concession area of the Velenje Coal Mine, on Družmirje Lake (hereinafter: FPV Družmirje).



Figure 1: Image of Družmirje Lake on orthophoto (Source: PV, October, 2024)

The area of Družmirje Lake shows potential for the installation of a large floating photovoltaic power plant covering up to 50% of the available lake surface. With the planned power plant, HSE aims to meet both its strategic objectives of increasing renewable energy generation capacity and the national targets set out in the National Energy and Climate Plan (NECP), which identifies solar energy as a key pillar.

The state spatial planning procedure is currently in the phase approving National Spatial Plan.

The subject of this project brief is the **preparation of design solutions for project documentation development – Developed Concept design for FPV Družmirje (hereinafter: rIDP design solutions for FPV)**, in accordance with all applicable regulations and professional standards, including consulting services provided by the Contractor.

2. Description of the Location and Land Development

Družmirje Lake, also known as Šoštanj Lake, is located near the town of Šoštanj and is the youngest of the three lakes od Šaleška valley. Like Velenje and Škale Lakes, it is an artificial subsidence lake formed as a result of coal mining activities, which have not yet been completed. The lake surface is therefore expected to continue changing.

The floating photovoltaic power plant is planned on Družmirje Lake (hereinafter: FPV Družmirje), covering up to 50% of the lake surface, which amounted to 133 ha in 2024. FPV Družmirje, together with associated power infrastructure, is permissible to plan in accordance with the conditions defined in a Decree on the National Spatial Plan for the Floating Photovoltaic Power Plant Družmirje, which is currently in a phase of approving.

Under applicable legislation, FPV Družmirje is classified as a floating structure. Its installation is therefore subject to inland navigation legislation and the Rules on Boats and Floating Structures. A permit for permanent mooring and anchoring to the lakebed is required. In accordance with conditions of the Rules on Boats and Floating Structures, it must be demonstrated that the floating structure does not obstruct navigation or endanger human life, property, or the environment. Land-based installations are subject to construction permits under applicable construction legislation.

Connection of FPV Družmirje to the electricity grid is planned in the area of the Šoštanj Thermal Power Plant (TEŠ), requiring the construction of appropriate medium-voltage cable lines and a distribution substation.

A temporary assembly platform will also be established onshore for assembling and launching photovoltaic elements onto the water. Upon completion of construction, the area will be rehabilitated in accordance with the spatial planning act.

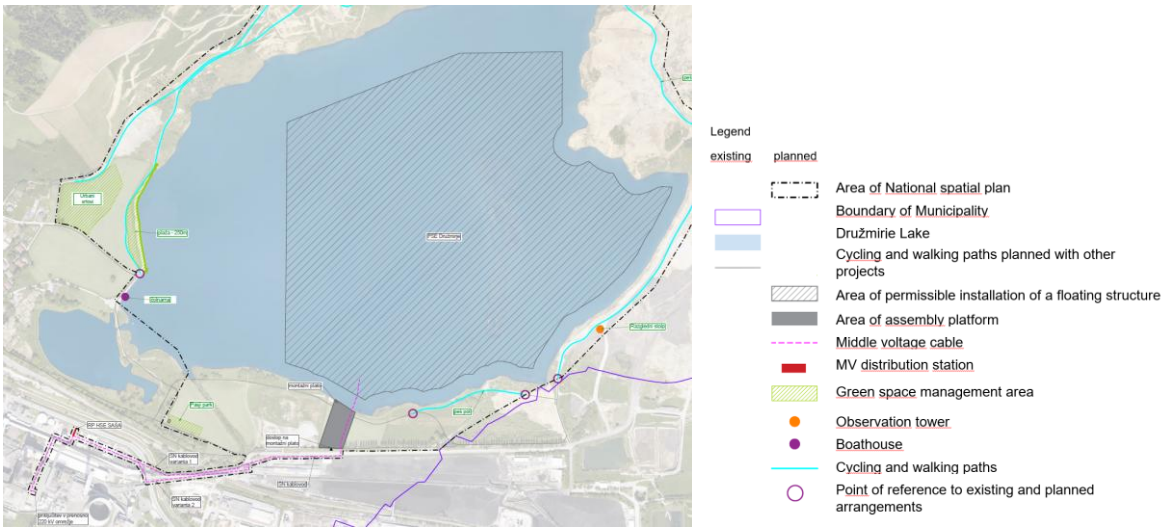


Figure 2: Excerpt from the overview of the DPN PSE Družmirje proposal (Source: National spatial plan, December 2025)

3. Design Documentation – Developed Design (rIDP)

The documentation provided for in this project assignment includes the creation of design solutions for a floating photovoltaic device with all the elements necessary for its connection to the electricity grid.

Onshore electrical cable connections are subject of a separate design and are not subject to this contract.

3.1 Area Boundary and Subject

The processing boundary is the water surface of Lake Družmirje with the area of the assembly plateau on the southern shore of the lake.

The subject of the development of design solutions is:

- the floating photovoltaic installation, including anchoring systems and other accompanying arrangements;

- the medium-voltage electrical connection to the lake shoreline.

Within the framework of design solutions, it is necessary to foresee account for all construction machinery, transport operations, and other relevant aspects necessary for assessing environmental emissions (noise, vibrations) during construction.

3.2 Scope of Design Documentation

Design solutions shall be prepared at the level of detail required for a Developed Concept Design (hereinafter: design solutions rIDP for FPV), in accordance with EN 16310:2013.

The documentation must comply with the spatial implementation act, construction legislation, regulations governing navigation and floating structures, water management, and other relevant regulations. In addition to EN 16310:2013, technical rules for floating structures and other applicable standards for floating photovoltaic systems shall be applied.

All applicable EU and Slovenian legislation and standards must be observed, and also good engineering practice applied.

Scope of documentation:

- **Phase 1**
  - preparation of design solutions rIDP for FPV;
  - consulting services during the preliminary environmental screening procedure.

Design solutions are prepared in the scope and accuracy as foreseen for the rIDP. Documentation is also prepared for the needs of implementing the preliminary procedure in the field of environmental protection.

Consulting services include active participation in the environmental screening procedure, preparation of additional explanations and arguments, optimisation proposals, and assistance in obtaining supplementary data required by competent government officials.

- **Phase 2**
  - harmonisation of design solutions rIDP for FPV following the decisions issued in the environmental screening procedure
  - consulting services until the start of subsequent design phases.

After the preliminary environmental screening procedure phase has been completed, the rIDP has to be harmonised with the conditions of the decision received.

Consulting services include activities needed for the client to enter and prepare for the next project documentation phase.

3.3 Scope of project design

Design solutions must include the following content:

- ***Construction field:***

  - floating substructure for PV modules inverters and transformer stations;
    - medium-voltage cable routes to the shoreline
    - AC and DC cable routes
    - service pontoon
  - anchoring system;
  - structural calculations.

- ***Field of electrical engineering:***

  - PV modules and inverters;
  - transformer stations and equipment;
  - DC connections (modules → inverters);
  - AC connections (inverters → substations);
  - MV connections between transformer station and between transformer stations and shoreline;
  - Lightning, electrical shock protection systems and other protective systems;
  - remote control of FPV;
  - electrical equipment sizing calculations;
  - energy yield calculation in PVSyst (P90).

The documentation shall also define, as a minimum:
- the type and sound power level of the transformers;
- the type, dimensions and thickness of the PV modules;
- the materials used for the construction of structural components;
- other data arising from the design conditions specified in the appendix to this project brief.

- ***Content required for the implementation of the preliminary environmental screening procedure:***

Within the design solutions it is also necessary to define the construction site area, including material handling operations, the types and specifications of materials (certifications), and the types of machinery required for the installation of the FPV as sources of noise and vibration, including information on the sound power levels of construction machinery, as well as the routes, methods and number of transport operations.

The design documentation shall also specify the proposed construction method and construction phases of installation of the FPV and the method of anchoring.

3.4 General conditions

When preparing project construction the Contractor shall:

- It is necessary to take into account the positive experiences of this kind of projects in the EU or beyond.

- The designer will take into account the current state of the terrain, facilities and other requirements of the spatial plan in the documentation at the same location.
- The telecommunications devices that are being installed must be logically connected to the existing telecommunications network.
- At the request of the client, the designer must participate in operational meetings, which are usually once a week or by agreement.
- The designer must cooperate with the producer of the geotechnical report and the coal mine concessionaire.
- It is necessary to prepare an inventory of works with a design estimate of the costs of equipment and materials that will be required for the implementation of the FPV. Graphic attachments and details must be prepared for the smooth implementation of all works.
- Documentation is submitted only in digital form.
- The submitted documentation must not bear a copyright symbol or a text (regulations) of equivalent content and becomes the property of the client, who can freely dispose of it.
- Documentation must be prepared in Slovenian or English.
- All documentation must be submitted in electronic form (unlocked). The expected documentation formats are: *.ifc, *.doc, *.docx, *.xls, *.xlsx, *.jpg, *.tif, *.dxf, *.dwg, *.dwf, *.shp. The searchable *.pdf format is only an addition to the aforementioned electronic documentation.
- The client also becomes the owner of all other original project documentation (such as: Eplan, etap, Autocad, ...)

3.5 Obligations of contractor

In addition to all tasks specified in the content and scope of work from this project task, the selected contractor has the following obligations:

- to perform the assumed services professionally, correctly, conscientiously and with quality in accordance with all applicable regulations and standards and with the client's program;
- to cooperate closely with the client and all stakeholders in the project;
- to interpret to the client all ambiguities in the scope of services;
- to perform all binding services economically and for the benefit of the client;
- to do everything within the scope of the assumed obligations to ensure that the deadlines are met;
- to make additions and changes to the assumed scope of services at its own expense and within the deadline agreed with the client, if it is determined that the contractor has performed the assumed services inadequately;
- to promptly inform the client about current issues and situations that may affect the performance of the assumed obligations;
- the contractor undertakes to perform the services transparently, by allowing the client regular insight into the work of its project team;
- to create documentation, use software packages that are compatible with modern versions of programs: textual part WORD, tables and spreadsheets EXCEL, graphic attachments in AUTOCAD programs. Documentation must be created in a format that is suitable for use in a GIS environment (graphic and attribute data);
- obtain all materials, documentation and technical bases necessary for creating the task;
- timely warn the client of any potential shortcomings in relation to the necessary starting points for creating the task and create the task with professional rules;
- participate in coordination meetings and presentations;
- create monthly reports on the status of the project and the work performed.

Communication will take place in Slovene/English language.

The creation of individual segments of the documentation also includes any additions and corrections that will arise from the requests of stakeholders or other justified reasons from the environmental assessment phase.

3.6 Obligations of the client

The client will provide the following documentation:

- design concept
- geodetic survey
- lake bathymetry
- geological and geomechanical surveys
- geotechnical report on the anchoring method
- other input data relevant for project design (wind load, snow load, climate and hydrological data,…).

4. Contract Price, Time Schedule and Payments

4.1 Contract price

The bid price should be given based on the following items:

- **Item 1:** Preparation of FPV design solutions at the rIDP level, including all additions and corrections necessary for submitting an application for the needs of the preliminary environmental screening procedure and consulting services during the preliminary procedure
- **Item 2:** Harmonisation of FPV design solutions at the rIDP level based on the conditions from the decision received from the preliminary environmental screening procedure and advisory services to the client until the preparation of the next phases of project documentation.

The contractor should also provide the price for consulting services in the estimated number of hours and hourly rate.

4.2 Time schedule

An integral part of the offer is a schedule that includes all phases of the scope of this project task and the deadlines for the preparation of all documentation. The approximate deadline for the implementation of all works envisaged in the project task is:

- Phase 1:
  - submission of documentation coordinated with the client's comments: 4 months after signing the contract, **no later than 30. 6. 2026**
  - consulting services in phase 1, **no later than 31. 12. 2026**
- Phase 2:
  - harmonisation of documentation after the completed preliminary environmental screening procedure: 1 month after obtaining the decision, **no later than 30. 3. 2027**
  - consulting services in phase 2, **no later than 30. 5. 2027.**

The deadline for the implementation of the works may also be changed or extended due to unforeseen circumstances. Unforeseen circumstances include an increase in the scope of works due to the requests of stakeholders, additional multi-phase coordination with individual stakeholders or a longer waiting period for their opinions, a decision that it is necessary to carry out an environmental impact assessment procedure and other unforeseen circumstances that could not have been foreseen at the time of preparation of the project task and offer.

After signing the contract, the contractor prepares a detailed schedule.

4.3 Payments

The selected bidder, upon receipt of the client's confirmation of performance for each lot, has the right to issue an invoice in the proportion of the total contract value that belongs to each phase, as shown in the table below (Act. 1, Act. 2). The payment date is 45 days from the date of receipt of the invoice.

	Preparation of Design Solutions	**Share**	**Duration (months)**
Phase 1	**Preparation of Design solutions for the purposes of the preliminary environmental screening procedure, including consulting services**		**4**
Act. 1	Preparation of draft disgn solutions, coordination with the client, investor, geologist and other stakeholders, presentation	56%	3
Act. 2	Harmonisation of documentation after client's review and submitting final reports	16%	1
Act. 3	Consulting services till Phase 2	8%	
Phase 2	**Harmonisation of design solutions after the implementation of the preliminary environmental screening procedure, including consulting services**		**1**
Act. 4	Harmonisation of design solutions based on the conditions obtained from the preliminary environmental screening decision received	18%	1
Act. 5	Consulting services	2%	

5. Attachments

The integral part of the project task are:

- Appendix 1: Conditions for designing the FPV Družmirje: the conditions are taken from the Regulation on the National Spatial Plan, which must be taken into account when preparing project solutions;
- Appendix 2: Graphic representation of the water surface area and the permissible placement of the floating structure of the FPV Družmirje in active format (.dwg)