

TERMS OF REFERENCE
Senior Hydro-Mechanical Engineer
Local Consultant
Zletovica Multipurpose Water System Project

1. Background

The Zletovica Hydrosystem (HS Zletovica) is a multipurpose water infrastructure system located in the northeastern and eastern parts of North Macedonia, primarily within the municipalities of Probištip and Kratovo. The system was designed to harness the water and hydropower potential of the Zletovska River for the integrated benefit of Kratovo, Probištip, Zletovo, Štip, Karbinci, Sveti Nikole, and Lozovo, collectively serving a population of approximately 100,000 people.

The Zletovica Hydrosystem has been conceived as a phased development:

- Phase I (Completed): Construction of the Kneževo Dam and Reservoir and regional water supply infrastructure.
- Phase II (Planned): Modernization and expansion of irrigation services over approximately 4,500 hectares.
- Phase III (Planned): Development of hydropower generation facilities integrated into the existing water system.

The Government of North Macedonia is preparing a World Bank-financed investment operation to support preparation and implementation of Phases II and III through a Grant Facility for Project Preparation (GFPP). A US\$2.0 million Grant Facility for Project Preparation (GFPP), closing on December 30, 2027, will finance priority preparation activities, including updates to technical and hydraulic studies, dam safety documentation, transboundary-water analyses, and environmental and social instruments consistent with the World Bank Environmental and Social Framework (ESF).

The GNM will implement the GFPP through the existing Project Implementation Unit (PIU) for the Agriculture Modernization Project (AMP), housed within the Ministry of Agriculture, Forestry and Water Economy (MAFWE), in close coordination with the Public Enterprise for Water Management Activities HS “Zletovica”–Probištip (PE HS Zletovica). The PIU will be responsible for overall grant implementation, including fiduciary, procurement, and environmental and social coordination. PE HS Zletovica will provide technical leadership, data, access to facilities, and institutional support. Under this arrangement, a Senior Hydro-Mechanical Engineer will be engaged full-time to support preparation of the proposed hydropower investments and, subject to project approval and availability of financing, their early implementation.

2. Objective of the Assignment

The objective of the assignment is to provide full-time technical expertise and quality assurance on all hydro-mechanical systems and equipment associated with the project, including design review, procurement support, construction supervision, testing, commissioning, operation, and maintenance considerations.

The objective of the assignment is to provide technical oversight and engineering support on hydro-mechanical systems and equipment associated with the preparation and implementation of Phase II irrigation and Phase III hydropower investments, ensuring that proposed investments are technically sound, operationally reliable, maintainable, cost-effective, safe, climate resilient, and fully aligned with applicable national requirements and World Bank standards. This includes support to preparation of technical documentation, detailed designs, procurement documents, construction supervision arrangements, testing and commissioning requirements, and operation and maintenance planning. The Expert shall serve as the principal hydro-mechanical advisor to the PIU and HS Zletovica.

3. Scope of Work and Responsibilities

The Senior Hydro-Mechanical Engineer will work as an integral part of the HS Zletovica technical team and coordinate closely with the Director of HS Zletovica, the PIU, specialized consultants, and the World Bank team.

The Engineer shall be responsible for the following:

- Review and provide technical recommendations on feasibility studies, hydraulic assessments, detailed engineering designs, technical specifications, and cost estimates related to hydro-mechanical equipment and systems.
- Review hydro-mechanical aspects of irrigation and hydropower infrastructure, including intakes, gates, valves, penstocks, pressure pipelines, surge protection systems, pumping stations, filtration facilities, steel structures, lifting equipment, irrigation control structures, and associated mechanical equipment.
- Review the technical and tender documentation prepared by consultants, with particular attention to technical adequacy, reliability, operability, maintainability, constructability, cost-effectiveness, and integration with civil, hydraulic, electrical, automation, and SCADA systems.
- Support the review and optimization of hydro-mechanical solutions for Phase II irrigation systems and Phase III hydropower facilities.
- Review hydro-mechanical interfaces with existing Phase I infrastructure, including Knežev Dam, outlet works, HPP B, water supply facilities, and associated operational systems.
- Contribute to the review and updating of dam safety documentation by assessing the hydro-mechanical condition and performance of gates, valves, outlet structures, spillway equipment, lifting systems, monitoring equipment, and other safety-critical mechanical components.
- Coordinate with dam safety specialists and ensure that relevant hydro-mechanical recommendations are appropriately reflected in technical studies, designs, plans, specifications, cost estimates, implementation arrangements, and bidding documents.
- Provide technical inputs to environmental and social instruments, including assessment of construction methods, equipment installation requirements, operational risks, worker safety considerations, and maintenance requirements.
- Participate in preparation, review, and finalization of technical sections of bidding documents for civil works, goods, and consulting services related to hydro-mechanical equipment and installations.

- Support preparation of technical specifications, equipment schedules, bills of quantities, testing procedures, factory acceptance testing requirements, site acceptance testing requirements, commissioning plans, and operation and maintenance manuals.
- Review manufacturers' technical submissions, shop drawings, fabrication drawings, equipment data sheets, inspection reports, and quality-control documentation.
- Participate in technical evaluations of bids, proposals, equipment suppliers, contractors, and consultant submissions, providing technical recommendations in accordance with applicable procurement procedures.
- Support construction supervision activities by reviewing installation methodologies, testing procedures, commissioning programs, and corrective actions related to hydro-mechanical works.
- Assist the PIU and HS Zletovica in identifying operational improvements and maintenance requirements for existing hydro-mechanical infrastructure.
- Provide advice, design, and deliver training and capacity-building activities for PIU staff and HS Zletovica personnel on operation, maintenance, inspection, and monitoring of hydro-mechanical systems.
- Prepare technical progress reports and provide substantive inputs to implementation status reports, aide-mémoires, supervision documentation, and project preparation documents.
- Participate in World Bank missions, technical meetings, field visits, and follow-up actions within the Engineer's area of responsibility.

4. Deliverables

The Consultant shall provide:

- **Inception report and work plan**, submitted within 15 calendar days of commencement, confirming the assignment methodology, document-review plan, priority issues, coordination arrangements, deliverable schedule, and initial risk and approvals register.
- **Technical review memoranda** covering hydropower feasibility and optimization studies, hydrological and energy-yield analyses, detailed engineering designs, technical specifications, equipment selection, cost estimates, and bidding documents for the Phase III hydropower investments, including their integration with Phase II irrigation infrastructure and the existing multipurpose water system. Reviews shall address relevant civil, hydraulic, electro-mechanical, electrical, control, and grid-interconnection aspects. Each memorandum shall be submitted within the period agreed for the respective package and present consolidated comments, their significance, recommended actions, and a clear conclusion on whether the submission is acceptable, acceptable subject to revisions, or requires resubmission.
- **Monthly progress reports**, summarizing activities completed, key technical findings and decisions, progress against the work plan, procurement and permitting status, principal risks, outstanding actions, and priorities for the following month.
- **Site-visit and technical-meeting notes**, normally submitted within five working days of each visit or meeting, documenting observations, technical issues, decisions, agreed actions, responsible parties, and deadlines.

- **Technical inputs to procurement**, project preparation, and implementation, provided as requested, including technical evaluation inputs, responses to clarifications, design and contract interface notes, and contributions to project appraisal, environmental and social instruments, dam safety coordination, and operation and maintenance arrangements. Where applicable to the authorized stage of the assignment, these shall also include inspection and test-plan comments, commissioning and grid-connection inputs, and handover and completion reviews.
- **Final assignment report**, submitted at the end of the contract, summarizing the work performed, the status of the hydropower investments, unresolved technical and institutional issues, lessons learned, and prioritized recommendations for subsequent implementation.

All deliverables shall be submitted in English and Macedonian in editable electronic format, with supporting calculations, review matrices, and source files, where applicable. Draft deliverables shall be reviewed by PE HS Zletovica and the PIU. The Consultant shall address consolidated comments and submit revised versions within the timeframe agreed for each deliverable.

5. Qualification and Experience Requirements

- University degree in Mechanical Engineering, Hydro-Mechanical Engineering, Hydraulic Machinery Engineering, Hydropower Engineering, or a closely related field. A Master's degree would be considered an advantage.
- Minimum 10 years of relevant professional experience in hydro-mechanical engineering associated with dams, hydropower facilities, irrigation infrastructure, pumping stations, water supply systems, or other major hydraulic infrastructure.
- Demonstrated experience in at least three large or technically complex water infrastructure projects involving hydro-mechanical equipment, gates, valves, penstocks, pumping systems, hydraulic steel structures, or hydropower facilities.
- Experience with dam outlet works, spillway gates, intake structures, pumping stations, pressure pipelines, irrigation control systems, and hydropower equipment is highly desirable.
- Demonstrated experience as Senior Hydro-Mechanical Engineer, Mechanical Engineer, Technical Reviewer, Design Engineer, Construction Supervision Engineer, or similar senior technical role.
- Experience in review of consultant outputs, equipment specifications, procurement packages, factory inspections, testing, commissioning, and contract implementation supervision is highly desirable.
- Familiarity with World Bank-financed projects, procurement procedures, and Environmental and Social Framework requirements is an advantage.
- Strong analytical, coordination, and technical report-writing skills.
- Professional proficiency in written and spoken Macedonian and English.

6. Reporting and Duration

- The Senior Hydro-Mechanical Engineer will report technically to the Director of PE HS Zletovica, who will provide day-to-day technical direction and review the Consultant's outputs. The PIU Coordinator/Project Director will serve as the contract-management focal point and provide administrative oversight and coordination on procurement, fiduciary, environmental, and social matters. Instructions that may affect the scope, schedule, or contract terms shall be issued through the PIU in accordance with the contract.

- The assignment is expected to be full-time during the GFPP-funded preparation period. Any continuation into project implementation will be subject to satisfactory performance, project approval, financing availability, and a contract extension or new contract, as applicable.

7. Duty Station

The Consultant shall be based full-time at HS Zletovica in North Macedonia and shall undertake regular field visits to project sites, existing facilities, construction locations, and relevant institutions as required.