

Handling mark: CZ-272-17/22

Appendix No. 1

**DETAILED DESCRIPTION OF THE SUBJECT MATTER OF THE CONTRACT
FOR THE SUPPLY OF ADDITIONAL SPECIALIZED SOFTWARE UNDER THE PROJECT
NAMED: "CENTER FOR SUSTAINABLE MANAGEMENT OF MINERALS AND ENERGY"**

DIVIDED INTO PARTS – THIRD PROCEEDINGS

This document is a detailed description of the subject matter of the contract for the purchase of specialist software. The Ordering Party has divided the contract into parts. Detailed description of the subject matter of the contract, within the scope of each part, has been defined by the Ordering Party individually for each program.

NOTICE:

The Ordering Party informs that the object of its activity is to conduct scientific research in the fields of technical sciences, earth sciences and economic sciences on the broadly understood management of mineral resources and energy management, and to disseminate the results of this research. The Ordering Party is authorized to confer the degree of Doctor of Technical Sciences in the discipline of mining and engineering geology. The Ordering Party, as a scientific unit, is not a commercial entity.

I. Subject matter of the contract

Part:

1. Itasca 3DEC

The subject matter of the contract is the delivery of Itasca 3DEC program. The Ordering Party requires the delivery of the software in accordance with the following requirements.

No	Delivery Item	License Type	Number of positions/ number of licenses
1.	Itasca 3DEC version 7.0	Academic Network License (Network License)	1

No	Delivery Item	Requirements
1.	Itasca 3DEC version 7.0	Itasca 3DEC program:

		<ul style="list-style-type: none"> • A license authorizing the use of the software on an unlimited number of devices at a single institution within a defined license type and a defined number of workstations, valid for 5 years from the time of delivery/installation by the user (for perpetual/lifetime licenses - valid indefinitely). • The ability to download, install and use, free of charge, patches and updates issued for the supplied software by the software producer for a minimum period of 12 months from the date of installation by the user (the moment of installation corresponding to the date of supply). • If an equivalent solution is offered the Contractor is required to demonstrate its equivalence. • The contractor offering an equivalent solution is obliged to include in the offer a detailed description of equivalent software and a practical demonstration of meeting the required functionality. • Description of an equivalent solution should include at least a description of the required parameters and functionalities for equivalent software. The description should clearly state that the software offered as equivalent meets the requirements specified by the Ordering Party. • The use of an equivalent solution will not require any additional action on the part of the Ordering Party.
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The Ordering Party allows the possibility to offer software equivalent to the software mentioned above. By equivalent software the Ordering Party means software that will have the following features:

- a) ability to simulate three-dimensional response of discontinuous media (such as interconnected rock or masonry structures) that are subject to static or dynamic loading,
- b) an explicit scheme of the distinct elements method for computation is available,
- c) possibility to analyze separate elements/blocks that are not deformable (rigid) or can be deformed, and allows you to specify separate models for the behavior of the connections between these blocks],
- d) at least 10 built-in constitutive models of the behavior of the modeled medium available, i.e.: elastic isotropic, transversely isotropic elastic, orthotropic elastic, Drucker-Prager, Mohr-Coulomb, Ubiquitous-joint (UBJ), Strain hardening/softening, Bilinear strain hardening/softening UBJ, Double yield, Modified Cam-clay, Hoek-Brown, Hoek-Brown-PAC,

- e) contains at least 4 built-in models of connections between elements t. j.: model elastic, Coulomb-Mohr, Continuously Yielding, Softening Healing Mohr-Coulomb, Bilinear Mohr-Coulomb, Power Law Creep,
- f) built-in FISH and Python scripting language,
- g) ability to perform associated mechanical and flow calculations
- h) ability to calculate the safety factor using the shear strength reduction (SSR) method
- i) extensive data visualization capabilities, including contouring on blocks, zones and joint surfaces; scalar, tensor and vector plots, contouring of 3D isolines of grid point and zone data
- j) ability to export charts and maps in PNG, DXF, VRML, SVG or PostScript formats
- k) export of results to .csv format
- l) automatic export of a series of .PNG format images at regular intervals during calculations to create video animations
- m) ability to use multithreading of the processor in calculations,
- n) ability to open and edit files with .sav, .prj extensions.

2. Leapfrog Geo

The subject matter of the contract is the delivery of Leapfrog Geo program. The Ordering Party requires the delivery of the software in accordance with the following requirements.

No	Delivery Item	License Type	Number of positions/ number of licenses
1.	Leapfrog Geo	1 academic network license	1

No	Delivery Item	Requirements
1.	Leapfrog Geo	<p>Leapfrog Geo program:</p> <ul style="list-style-type: none"> • A license authorizing the use of the software on an unlimited number of devices at a single institution within a defined license type and a defined number of workstations, valid for 5 years from the time of supply/installation by the user (for perpetual/lifetime licenses - valid indefinitely). • The ability to download, install and use, free of charge, patches and updates issued for the supplied software by the software producer for a minimum period of 12 months from the date of installation by the user (the moment of installation corresponding to the date of supply). • If an equivalent solution is offered the Contractor is required to demonstrate its equivalence.

		<ul style="list-style-type: none"> • The contractor offering an equivalent solution is obliged to include in the offer a detailed description of equivalent software and a practical demonstration of meeting the required functionality. • Description of an equivalent solution should include at least a description of the required parameters and functionalities for equivalent software. The description should clearly state that the software offered as equivalent meets the requirements specified by the Ordering Party. • The use of an equivalent solution will not require any additional action on the part of the Ordering Party.
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The Ordering Party allows the possibility to offer software equivalent to the software mentioned above. By equivalent software the Ordering Party means software that will have the following features:

- a) possibility of three-dimensional geological modeling and visualization of deposits using implicit modelling (implicit modelling),
- b) modeling of reservoir structure and quality,
- c) creation of geological models from borehole data, structural geological data, CAD data (points, polylines and grids),
- d) analyze source data using statistical tools (dot plots, Q-Q plots, box plots, histograms),
- e) surface and solid modeling,
- f) modeling of vein deposits,
- g) modeling of stratigraphic sequences,
- h) defining the chronology of geologic surfaces,
- i) modeling of fold structures,
- j) fault modeling including relationships between fault systems,
- k) interpolation of geological data in domains with anisotropy consideration,
- l) creation, visualization and export of iso-surfaces and solids,
- m) creation of 3D block models,
- n) reservoir resource estimation,
- o) creating geologic cross sections through a geologic model,
- p) create and render scenes and animations based on the geological model,
- q) automatic updating of the model when new source data is entered,
- r) automatic updating of dependent models when changes are made to the reference model.

3. DecisionTools Suite

The subject matter of the contract is the supply of DecisionTools Suite program. The Ordering Party requires the supply of the software in accordance with the following requirements.

No	Delivery Item	License Type	Number of license sets
1.	DecisionTools Suite	license DecisionTools Suite Academic Desktop + license DecisionTools Suite Student License (concurrent)	1

No	Delivery Item	Requirements
1.	DecisionTools Suite	<p>DecisionTools Suite:</p> <ul style="list-style-type: none"> • A license authorizing the use of the software on an unlimited number of devices at a single institution within a defined license type and a defined number of workstations, valid for at least 5 years from the time of delivery/installation by the user (for perpetual/lifetime licenses - valid indefinitely). • The ability to download, install and use, free of charge, patches and updates issued for the supplied software by the software producer for a minimum period of 12 months from the date of installation by the user (the moment of installation corresponding to the date of supply). • If an equivalent solution is offered the Contractor is required to demonstrate its equivalence. • The contractor offering an equivalent solution is obliged to include in the offer a detailed description of equivalent software and a practical demonstration of meeting the required functionality. • Description of an equivalent solution should include at least a description of the required parameters and functionalities for equivalent software. The description should clearly state that the software offered as equivalent meets the requirements specified by the Ordering Party. • The use of an equivalent solution will not require any additional action on the part of the Ordering Party.

The Ordering Party allows the possibility to offer software equivalent to the software mentioned above. By equivalent software the Ordering Party means software that will have the following features:

1. probabilistic modeling and risk analysis capabilities,
2. Monte Carlo and Hypercube sampling available,
3. available time series forecasting,
4. available multi-criteria optimization,
5. creating empirical probability distributions,
6. ability to match theoretical probability distributions to empirical data,
7. correlating probability distributions including using copulas,
8. working in the Windows operating system,
9. cooperation with 32-bit or 64-bit excel 2007 or newer,
10. Goal Seek available,
11. Stress Analysis available,
12. conversion to Crystall Ball.

4. FEFLOW FMH3

The subject matter of the contract is the delivery of FEFLOW FMH3 program. The Ordering Party requires the delivery of the software in accordance with the following requirements.

No	Delivery Item	License Type	Number of positions/ number of licenses
1.	FEFLOW FMH3 v. 7.2 or higher	commercial network license	1

No	Delivery Item	Requirements
1.	FEFLOW FMH3 v. 7.2 or higher	<p>FEFLOW FMH3 v. 7.2 or higher</p> <ul style="list-style-type: none"> • A license authorizing the use of the software on an unlimited number of devices at a single institution within a defined license type and a defined number of workstations, valid for 5 years from the time of delivery/installation by the user (for perpetual/lifetime licenses - valid indefinitely). • The ability to download, install and use, free of charge, patches and updates issued for the supplied software by the software producer for a minimum period of 12 months from the date of installation by the user (the moment of installation corresponding to the date of supply).

		<ul style="list-style-type: none"> • If an equivalent solution is offered the Contractor is required to demonstrate its equivalence. • The contractor offering an equivalent solution is obliged to include in the offer a detailed description of equivalent software and a practical demonstration of meeting the required functionality. • Description of an equivalent solution should include at least a description of the required parameters and functionalities for equivalent software. The description should clearly state that the software offered as equivalent meets the requirements specified by the Ordering Party. • The use of an equivalent solution will not require any additional action on the part of the Ordering Party.
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The Ordering Party allows the possibility to offer software equivalent to the software mentioned above. By equivalent software the Ordering Party means software that will have the following features:

- a) possibility of 3-dimensional modeling of transient groundwater flow and heat transport in porous media, in particular modeling of geothermal reservoirs,
- b) solving systems of equations based on the finite element method,
- c) includes thermodynamic parameters of water (such as density and dynamic viscosity) are determined as a function of temperature,
- d) ability to model contaminant transport in porous media,
- e) ability to use and create unstructured meshes to represent fault surfaces, among other things,
- f) possibility to calibrate the model using PEST software,
- g) ability to simulate borehole heat exchangers (OWC) - single as well as a set of multiple OWC (Borehole Thermal Energy Storage technology),
- h) graphical user interface for model building, running simulations and visualizing results,
- i) ability to analyze the flow balance within the limits of the computational model,
- j) ability to edit and execute scripts written in the Python 3.x programming language
- k) support shapefile files (*.shp) and FeFlow (*.fem) files.

5. EDN

The subject matter of the contract is the delivery of EDN program. The Ordering Party requires the delivery of the software in accordance with the following requirements.

No	Delivery Item	License Type	Number of positions/ number of licenses
1.	EDN	commercial single user license	1

No	Delivery Item	Requirements
1.	EDN	<p>EDN Program</p> <ul style="list-style-type: none"> • A license authorizing the use of the software on an unlimited number of devices at a single institution within a defined license type and a defined number of workstations, valid for 5 years from the time of delivery/installation by the user (for perpetual/lifetime licenses - valid indefinitely). • The ability to download, install and use, free of charge, patches and updates issued for the supplied software by the software producer for a minimum period of 12 months from the date of installation by the user (the moment of installation corresponding to the date of supply). • If an equivalent solution is offered the Contractor is required to demonstrate its equivalence. • The contractor offering an equivalent solution is obliged to include in the offer a detailed description of equivalent software and a practical demonstration of meeting the required functionality. • Description of an equivalent solution should include at least a description of the required parameters and functionalities for equivalent software. The description should clearly state that the software offered as equivalent meets the requirements specified by the Ordering Party. • The use of an equivalent solution will not require any additional action on the part of the Ordering Party.

The Ordering Party allows the possibility to offer software equivalent to the software mentioned above. By equivalent software the Ordering Party means software that will have the following features:

- a) prediction of mining area deformation using Budryk-Knothe theory,
- b) spatio-temporal modeling of mining operations taking into account the time lag of revealed impacts,

"Center for Sustainable Management of Raw Materials and Energy" - a project co-financed by the European Regional Development Fund under the Regional Operational Program of the Malopolska Region for 2014-2020.

- c) consideration of the slope of the decks,
- d) consideration of the impact of the mining fringe,
- e) consideration of distant influences,
- f) to take into account the activation of the old doves,
- g) determination of extreme deformations over time,
- h) determination of effective extreme deformations over time,
- i) creation of contour maps with mining area category boundaries.

6. VENTSIM DESIGN (Advanced)

The subject matter of the contract is the delivery of VENTSIM DESIGN (Advanced) program. The Ordering Party requires the delivery of the software in accordance with the following requirements.

No	Delivery Item	License Type	Number of positions/ number of licenses
1.	VENTSIM DESIGN (Advanced)	commercial single user license	1

No	Delivery Item	Requirements
1.	VENTSIM DESIGN (Advanced)	<p>VENTSIM DESIGN (Advanced) program:</p> <ul style="list-style-type: none"> • A license authorizing the use of the software on an unlimited number of devices at a single institution within a defined license type and a defined number of workstations, valid for 5 years from the time of delivery/installation by the user (for perpetual/lifetime licenses - valid indefinitely). • The ability to download, install and use, free of charge, patches and updates issued for the supplied software by the software producer for a minimum period of 12 months from the date of installation by the user (the moment of installation corresponding to the date of supply). • If an equivalent solution is offered the Contractor is required to demonstrate its equivalence. • The contractor offering an equivalent solution is obliged to include in the offer a detailed description of equivalent software and a practical demonstration of meeting the required functionality.

		<ul style="list-style-type: none"> • Description of an equivalent solution should include at least a description of the required parameters and functionalities for equivalent software. The description should clearly state that the software offered as equivalent meets the requirements specified by the Ordering Party. • The use of an equivalent solution will not require any additional action on the part of the Ordering Party.
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The Ordering Party allows the possibility to offer software equivalent to the software mentioned above. By equivalent software the Ordering Party means software that will have the following features:

- a) 3D design modeling, simulation and optimization of ventilation systems in underground mines,
- b) available 3D graphics environment with smooth rotation, zooming and panning,
- c) possibility to model real dimensions and shapes of ventilation workings,
- d) ability to model heat and moisture with the surrounding mountain,
- e) ability to model cooling or heating of the air,
- f) airflow simulation and fan modeling capabilities,
- g) ability to simulate the spread of contaminants,
- h) ability to simulate emergency situations,
- i) air flow animation available,
- j) ability to import pit designs (axes, solids) from the mining planning packages Deswik Datamine,
- k) possibility to import DXF files.