

Date of Submission	04/08/2016
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IPL Project Proposal Form 2016

1. **Project Title:** The development of paleo-landslides in the middle part of the Moskva River valley within the limits of the Moscow City

2. **Main Project Fields:**

(2) Targeted Landslides: Mechanisms and Impacts

B. Landslides Threatening Heritage Sites

(3) Capacity Building

A. Enhancing Human and Institutional Capacities

B. Collating and Disseminating Information/ Knowledge

3. **Name of Project leader:** Oleg Zerkal

Affiliation: Engineering and Ecological Geology Department of the Geological Faculty of the Lomonosov Moscow State University, Moscow

Head of the Laboratory of Engineering Geodynamics and Substantiation of Engineering Protection of Territories

Contact: Engineering and Ecological Geology Department, Geology Faculty, 1, Leninsky Gory str., MSU, Moscow, 119991

+7 (495) 939-25-68, igzov@mail

Core members of the Project

Names/Affiliations:

Samarin E.N. – Professor, Engineering and Ecological Geology Department, Geology Faculty, Lomonosov Moscow State University, Moscow

Barykina O.S. - Leading researcher, Engineering and Ecological Geology Department, Geology Faculty, Lomonosov Moscow State University, Moscow

Fomenko I.K. - Chief specialist in geotechnical engineering, Research and Production Center for Engineering Surveys, Moscow

Gvozdeva I.P. – Senior Researcher, Engineering and Ecological Geology Department, Geology Faculty, Lomonosov Moscow State University, Moscow

4. **Objectives:**

1. Analysis of the paleo-landslides influence on formation of modern engineering-geological conditions.
2. Scientific support and examination of site investigations for development of the Moscow City territories where paleo-landslides are distributed.

5. **Background Justification:**

Landslides in Moscow City area have been studied for more than 150 years. Currently on the territory of the City more than 220 modern landslides are reported. 16 of them are from several hundreds to several

millions cubic meters in volume. The data collected suggest that part of modern large-scale landslides have been formed within the areas that had been affected by the pre-glacial slope deformations.

The second important point is that the in large cities areas that have been considered in the past as inappropriate for installation of any permanent structures due to high risk of the geohazards development are widely used now for construction. In Moscow the geological hazards at the part of these areas are predetermined by paleo-landslides that have been buried by more recent Quaternary glacial, fluvio-glacial and alluvial sediments.

6. Study Area:

The territory of the Moscow City

7. Project Duration:

2017-2018

8. Resources necessary for the Project and their mobilization

Budgets – \$US 10 000

9. Project Description:

The territory of the Moscow City is studied quite well from the engineering-geological viewpoint. (currently, the boreholes database includes a description of about 100 thousand wells). By the mid-twentieth century the concept of the landslides distribution in the Moscow City area and on the conditions of their activity has been elaborated. It is believed that all largest Moscow landslides are known and that should taken into consideration for the construction sites assessment. This concept, however, often ignore the evolution of certain parts of the Moskva River valley, that underwent numerous transformations. In particular, paleo-landslides had been developed on the slopes of the Moskva River paleo-valley, and they were buried by the Quaternary deposits of different origin – glacial, fluvio-glacial and fluvial. They could be exhumed during construction of the deep-seated structures, which foundations exceed 15 meters. Such paleo-landslides can complicate engineering-geological conditions of the construction sites and could be activated by the improper technical activities.

The proposed project aims to study landslides at the areas where intensive site investigation are performed according to the standard programs. The re-interpretation of geotechnical data, considering the geological history of the area will be carried out within the frames of the project. Safety factors considering actual engineering-geological conditions will be recalculated.

10. Work Plan/Expected Results:

2017 – Scientific support of sites investigation, including field works (sites "Vorobiev Gory", "Karamyshevskaya naberezhnaya", "Shenogyna", ect.); Soil and rock sampling of landslide deposits; Data collection and results of investigation; Examination of the survey results.

2018 – Laboratory test of the physical and geotechnical characteristics; Analysis of detected paleo-landslides; Estimating present and pre-historic slope stability; Preparing recommendations to mitigate landslide risk.

11. Deliverables/Time Frame:

2017 - Scientific advice on the program of sites investigation (sites "Vorobiev Gory", "Karamyshevskaya naberezhnaya", "Shenogyna" and ect.); A set of sample of landslide deposits; The dataset of results of site

investigation.

2018 – Result of laboratory test of the physical and geotechnical characteristics; Description of the identified paleo-landslides; Description of the conditions of paleo-landslides activity (according to the results of results of estimating present and pre-historic slope stability).

12. Project Beneficiaries:

1. Students of Geology Faculty of the Lomonosov Moscow State University (participation in the works, an illustrative example while learning)
2. Department of capital construction of the Moscow City government.

13. References (Optional):

1. Samarin E.N., Zerkal O.V. (2004) Paleolandslides in valley of Kunya-river and their influencing on modern slope instability//Landslides: Evaluation&Stabilization (Proc. IX International Symp. on Landslides, 28.06-02.07.2004, Rio de Janeiro). Balkema, v. 1, pp. 243-249
2. Zerkal O.V., Fomenko I.K. (2016) Influence of various factors on the results of probabilistic analysis of landslide activization. Inzhenernaya geologiya (Engineering Geology), (1): 16-21 (in russian)
3. Egorov Y.K., Zerkal O.V. (2016) Analysis of hazardous geological processes while engineering investigations at the territory of the Moscow city. Abstract book of the International Symposium "On challenges for engineering geology and geotechnics after natural disasters", 20-23 June 2016. Sofia, pp. 45-46