Date of Submission	2023.04.10

IPL Project Annual Report Form 2022

1 January 2022 to 31 December 2022

1. Project Title

   Landslides Mechanism and the Subgrade Stability Controlling Measures in Island Permafrost Area (IPL 167)

2. Main Project Fields

   Mitigation, Preparedness and Recovery

3. Name of Project leader

Wei Shan

Wei Shan: Northeast Forestry University (NEFU), Harbin, China. Contact: Tel/Fax: +86 (0)451 8219 1477, E-mail: shanwei456@163.com

Core members of the Project:

Dr. Ying Guo, Northeast Forestry University, China

Dr. Hua Jiang, Northeast Forestry University, China

Dr. Chunjiao Wang, Northeast Forestry University, China

Dr.Zhaoguang Hu, Northeast Forestry University, China

4. Objectives: (5 lines maximum)

   Under the permafrost, landslides and other complex geological conditions investigation, design, construction and monitoring technical of express way expansion project.

5. Study Area: (2 lines maximum)

   Bei-Hei Expressway Extension Project K160~K182 Section

6. Project Duration (1 line maximum)

   2009.08-2024.12

7. Report

1) Progress in the project: (30 lines maximum)

   In 2022, continuous monitoring will be conducted on typical road sections for landslide disasters, while summarizing monitoring and control experience and summarizing typical cases.

2) Planned future activities or Statement of completion of the Project (15 lines maximum)

Summarize the characteristics of frozen soil degradation, disaster occurrence, and engineering facility construction methods in this region.

3) Beneficiaries of Project for Science, Education and/or Society (15 lines maximum)

Permafrost research has been accompanied by human activities. In addition to geological disasters, permafrost degradation will also have various impacts. Therefore, it is of great scientific significance for people to understand the knowledge of permafrost and make early prediction and preparation.

4) Results: (15 line maximum, e.g. publications)

Publications

1. Shan W.; Yang T.; Guo Y.; Zhang C.; Hu Z.; Wang Y. Thermohydromechanical coupling analysis and engineering verification of gravel pile groups for strengthening permafrost marshland highway foundations. Bulletin of Engineering Geology and the Environment 2022, 81(7), 1-20.

2. Shan, W.; Qiu, L.; Guo, Y.; Zhang, C.; Xu, Z.; Liu, S. Spatiotemporal Distribution Characteristics of Fire Scars Further Prove the Correlation between Permafrost Swamp Wildfires and Methane Geological Emissions. Sustainability 2022, 14, 14947, doi:10.3390/su142214947.

3. Shan, W.; Ma, M.; Guo, Y.; Zhang, C. Numerical Analysis of the Influence of Foundation Replacement Materials on the Hydrothermal Variation and Deformation Process of Highway Subgrades in Permafrost Regions. Water 2022, 14, 2642, doi:10.3390/w14172642.

4. Shan, W.; Ma, M.; Guo, Y.; Zhang, C. Numerical Analysis of the Influence of Block-Stone Embankment Filling Height on the Water, Temperature, and Deformation Distributions of Subgrade in Permafrost Regions. Water 2022, 14, 1382, doi:10.3390/w14091382.

Four hosts:

*Xianzhao Li - Master's Degree

School: School of Civil Engineering, Northeast Forestry University, Harbin, China

Title: Research on the Temperature Change and Disease Prevention and Control Technology of Frozen Soil Roadbed of G331 Line Shila Section Highway

*Kai Wang - Master's Degree

School: School of Civil Engineering, Northeast Forestry University, Harbin, China

Title: Research on Surface Deformation along the Beihei Expressway Based on Time Series InSAR Technology

*Jin Song - Master's Degree

School: School of Civil Engineering, Northeast Forestry University, Harbin, China

Title: Analysis and Research on High Density Electrical Forward and Reverse Imaging of Freezing Soil Foundation on Highway

*Shiyao Qv - Master's Degree

School: School of Civil Engineering, Northeast Forestry University, Harbin, China

Title: Discrete Element Analysis of Hydrothermal Changes in Silty Clay During Freezing Process

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