

IPL Project (IPL - 188) Annual Report Form 2017

1 January 2016 to 31 December 2016

1. Project Number (approved year) and Title,

IPL – 188 (approved year: 2013)

Title: Study of slow moving landslide Potoška planina (Karavanke Mountain, NW Slovenia)

2. Main Project Fields

Monitoring and Early Warning

Catastrophic landslides

3. Name of Project leader

Marko Komac, BSc, MSc, PhD

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Core members of the Project: Names/Affiliations: (4 individuals maximum)

Tina Peternel, PhD student, young researcher, Geological Survey of Slovenia

Jernej Jež, BSc, MSc, PhD, Geological Survey of Slovenia

Blaž Milanič, BSc, researcher, Geological Survey of Slovenia

Mateja Jemec Auflič, BSc, MSc, PhD, Geological Survey of Slovenia

4. Objectives: (5 lines maximum)

The main objectives and actions are directed towards periodical monitoring of the landslide dynamic using different types of monitoring techniques. The main purpose of the periodic monitoring is to provide spatial and temporal measurements of the landslide dynamic and to ensure the continued assessment of the landslide activity. The goal is to improve our understanding of the causes of ground failure and to assess the dynamics of the landslide for the purpose of mitigation measures design for this particular case study.

5. Study Area: (2 lines maximum)

The Potoška planina landslide is situated in the Karavanke mountain ridge in north-western

Slovenia, above the settlement of Koroška Bela, which lies on the outskirts of the town of Jesenice.

6. Project Duration (1 line maximum)

3 years (2013 – 2016)

7. Report

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

Project “Study of slow moving landslide Potoška planina (Karavanke Mountain, NW Slovenia)” was approved in November, 2013. The broader area of the Potoška planina landslide is known to have experienced severe debris-flow events in the recent geological past. The most recent of these events occurred in the 18th century and caused the partial or total destruction of more than 40 buildings and cultivated areas in a village down-slope (Koroška Bela) located in the area of the alluvial fan. Considering that the Potoška planina landslide lies above the village Koroška Bela, which occupies an area of 1.02 km² and is densely populated (with more than 2,200 inhabitants), the landslide could represent a huge hazard to inhabitants and public infrastructure (i.e., a major railway, local road and steel factory).

The geological and tectonic setting of the wider Potoška planina area is fairly complex and consequently is very prone to different types of slope mass movements. Due to its unfavorable geological conditions, historical debris-flow events and past observations of slope (in) stability, the continuous observation of the dynamics and behavior of the Potoška planina landslide is necessary.

In order to recognize and understand the slope mass movements of the Potoška planina landslide it was crucial to apply engineering-geological approach. It is also essential to set up the flexible and reliable monitoring system in order to monitor visible surface changes through time and space: displacement rates and extent, changes in elevation and changes in volume. Monitoring of changes on the surface and observation of surficial displacements can be achieved using different surveying techniques. In order to estimate the surface movement pattern of the Potoška planina landslide periodic monitoring was performed using results of independent surveying techniques: photogrammetry using unmanned aerial vehicle (UAV), terrestrial laser scanning (TLS) and tachymetric measurements.

The main purpose of the periodic monitoring is to provide spatial and temporal measurements of the landslide displacements and to ensure the continued assessment of the behavior and dynamics of the landslide movements in the study site.

In the spring of 2016, in the frame of European Commission funded project “Resilient European Communities Against Local Landslides (RECALL)” co-funded by the European Civil Protection

Financial Instrument, the real-time monitoring system was developed and installed at the lower part of Potoška planina landslide. The following monitoring system is based on recording system using 2 cameras that provide real-time monitoring data of surface movement patterns and immediate notification of landslide activity and landslide behavior. Recorded 3D images from recording system are transmitted in real time through network for transmission. Currently, the monitoring system is at the testing stage.

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

The IPL project “Study of slow moving landslide Potoška planina (Karavanke Mountain, NW Slovenia)” (IPL 188) ended in November 2016.

However, the future activities are focused to continue the periodical monitoring of the Potoška planina landslide using different high resolution surveys techniques (e.g. TLS, UAV photogrammetry, etc.) and in-situ equipment (rain-gauge station, tachymetric geodetic measurements). However, it is essential to point out that current available data, such as surface movement pattern, contribute significantly to a better understanding of the behaviour and dynamics of the landslide, but cannot provide a clear and accurate picture of instability of the study area.

In order to estimate the real effect of the tectonic, geological and weather conditions on slope mass movements the geotechnical and geophysics measurements would be necessary. In the frame of geotechnical measurements it would be essential to do at least 4 boreholes (with depth around 30 m) that would be equipped with inclinometers and piezometers. Up to now we could not provide geotechnical measurements due to lack of funding.

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

- Beneficiary is local community and inhabitants of Koroška Bela settlement that potentially could be threatened by the potential debris-flow
- Public infrastructure: In case of debris-flow event also major railway line could be affected in addition to a local road and possibly also steel factory.
- A significant contribution in the fields of science:
 - in order to understand the dynamics and behavior of the slope mass movements of Potoška planina landslide and to emphasize the engineering geological aspect by evaluation of different techniques for monitoring landslide movements.
 - important contribution in the field of integration and comparison of results/models obtained using in-situ measurements, remote sensing

techniques and terrestrial surveys techniques. Moreover the integration of 2-dimensional and 3-dimensional data will be carried out.

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

In the frame of ongoing project the following publications were published:

Peternel, T., Kumelj, Š., Oštir, K., Komac, M. 2017. Monitoring the Potoška planina landslide (NW Slovenia) using UAV photogrammetry and tachymetric measurements. Landslides 14,1: 395–406.

Note:

- 1) If you will change items 1)-6) from the proposal, please write the revised content **in Red**.
- 2) Please fill and submit this form by **30 March 2017** to ICL Network <icl-network@iclhq.org>