

Nature-Based Solutions for Demonstrating Climate-Resilient Critical Infrastructure



Deliverable 3.4: Infrastructure Characterisation Historical



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Deliverable Factsheet

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Executive Summary

This deliverable presents the historical structural health assessment of infrastructures and assets at two demonstration sites within the NATURE-DEMO project: Gschliefgraben valley (Austria) and the Gradaščica River, Ljubljana (Slovenia).

The analysis is based on satellite radar interferometry (InSAR), combining high-resolution Persistent Scatterer Interferometry (PSI) and medium-resolution data from the European Ground Motion Service (EGMS). These datasets are complemented by time series forecasting derived from CMIP6 climate projections and further processed through two analytical tools: Satellite Structural Health Monitoring (S-SHM) and Linear Asset Structural Stability (LASS).

For Gschliefgraben, both asset-level (high-resolution PSI) and regional-level (EGMS) assessments were conducted. Results indicate a general pattern of slow ground movement consistent with the known landslide dynamics of the area. Despite the geomorphological activity, most structures and infrastructures exhibit stable behaviour, with the majority classified as “Green” under the applied RAG thresholds. Only a small proportion of elements show “Amber” alerts, and no critical (“Red”) alerts were detected. This suggests that existing mitigation measures, including nature-based and engineered interventions, may be contributing positively to structural stability, although uncertainties remain.

For Ljubljana, the analysis focuses on the south-western urban area along the Gradaščica river, which is prone to flooding. The regional assessment reveals spatially heterogeneous subsidence patterns, with localized areas showing significant accumulated displacement. While most infrastructure segments remain stable, a limited number of “Amber” and “Red” alerts were identified, particularly in zones affected by flood dynamics and recent hydraulic interventions. These areas require further attention in subsequent risk assessments.

The results provide essential input for the vulnerability index used in the assessment framework developed in WP2, specifically contributing to the displacement coefficient used in the Level 2 risk assessment methodology. Furthermore, the higher-resolution outputs will support detailed Level 3 analyses by site stakeholders.

Overall, this deliverable establishes a baseline for monitoring structural health and enables future evaluation of the effectiveness of nature-based solutions and other interventions implemented during the project.

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