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DESIGN APPROACH FOR IMPROVING RAMPART ROADS

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Approximately 17% of the land surface of Ireland is covered with peat. However, some counties have significantly higher values, particularly in the midlands and western counties. County Leitrim, for instance, has peat coverage of about 36%. In Ireland, the roads across the peatlands started to be properly developed during the eighteenth century to gain commercial and military access to remote rural areas. During the eighteenth and nineteenth centuries peat was the only fuel most people had. The roads built across the peatlands provided better access and made peat harvesting for fuel easier. Peat harvesting led to a rapid cut away of the peat in the vicinity of the roads leaving the road surface, in some cases, many meters above the surrounding surface (Figure 1), creating what is known in Ireland as rampart roads.



Figure 1: Rampart road on the Ballycumber to Moate road, County Offaly, Ireland.

Rampart roads often undergo considerable distortion (Figure 2) due to the low shear strength and high compressibility of the peat foundation, which may pose a significant safety hazard. Hence, high maintenance budgets are necessary to keep roads in service. There is an urgent need to improve rampart roads in Ireland to meet the modern traffic demands, the safety requirements and to reduce maintenance costs. The roads have to be widened and the quality of the road surface has to be improved. Challenges arise from different sources when improving rampart roads, namely:

- From the low shear strength of the peat foundation and underlying soils that can lead to shear failure.
- From the compressibility of the peat foundation which cause both short and long term settlements.
- From the differential settlements between the old and the new sections of the road.
- From the relatively high elastic deformations under wheel loads which can lead to cracking of the bituminous road surface.



Figure 2: Extreme undulations on the rampart road of the N62 national secondary road, County Offaly, Ireland.

Currently there is no consistent methodology for designing rampart roads improvements. Nevertheless, County Councils have tried different methods over the years to improve, widened and reduce maintenance costs in rampart roads. However the different methods have never been assessed in detail and the design and construction methodologies have never been recorded to be used by others. The methods include the use of lightweight fills, preconsolidation of the peat foundation and the use of geosynthetic reinforcement, amongst others.

The research will include compiling existing records of the improvement methods adopted for rampart roads, monitoring selected sections of roads and a critical analysis of geotechnical and other factors that affect the rampart roads performance. Laboratory testing, field trials and numerical modelling of innovative methods that could have significant technical and economical advantages will also be undertaken. The main output from the project will be the development of a methodology for the design of rampart roads improvements.