
This study is a preliminary assessment of the geomorphic impacts of road construction based on two test areas located along the A9 in Scotland; a southern section 30 km in length just north of the city of Perth, and a northern section 12.5 km in length just south of the city of Inverness.

Estimates of the depths of cuttings and embankments formed during road construction have been made through comparison of ground levels recorded in pre-construction borehole logs along the road route with digital elevation models representing the modern ground surface. This study trials two methods of assessing surface change and the volume of material excavated or deposited along the road route. Firstly a direct comparison of borehole ground levels with the modern ground surface is used. The second method involves reconstruction of the pre-road ground surface through re-interpolation of the digital elevation models which are then validated by comparison with the actual pre-road ground level recorded in the boreholes. Volumes of material excavated and deposited are then derived by comparison of the re-interpolated digital elevation model with original (the modern ground surface).

Both analysis methods indicate that there has been a net loss of material in the study areas, that equates to an average surface lowering along the road route of 2 to 2.5 m in the northern area, and 0.4–0.7 m in the southern area.

Comparison of average rates of ‘erosion’ resulting from road construction with natural river erosion rates indicates that erosion associated with road construction occurs at rates that are 2–3 orders of magnitude faster than even the most rapid erosion recorded in natural streams worldwide, and 3–4 orders of magnitude faster than previously measured river erosion rates in Scotland. Only rare catastrophic flood events are capable of excavating gorges at rates equivalent to the rate of cutting excavation during road construction.

The surface lowering and net material transfer associated with road construction is likely to strongly affect local geomorphic systems, with knock-on effects for hydrological and ecological systems in the vicinity of roads. As there are nearly 250 thousand miles of road within the UK, road construction is likely to have significant impacts on geomorphic and environmental systems at national scales.

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- OR/14/051 The geomorphic impact of road construction: a case study of the A9 in Scotland