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Climate change impacts and recommended adaptive actions in the construction industry

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The impact of weather and climate on construction in Europe has been well documented. In addition, the physical processes are well understood and the main agents involved have been identified: water; ice; wind; salts; thermal changes; atmospheric pollution; and microbiological organisms. However, what is lacking in the literature is an assessment of anticipated climate change impacts on key vulnerable areas of the construction industry. This strand of research aims to investigate and recommend adaptive actions for two key climate-sensitive areas relevant to construction in the Irish context: driving rain; and effluent management.

Driving rain is a phenomenon that predominantly affects the north and west coasts of Ireland. In future it is likely to become an issue for more of the Irish interior, especially in western and north-western zones, due to expected increases in winter precipitation and wind. The result will be a potential increase in building envelope penetration and moisture ingress, with consequent negative implications for U-values, occupants' health and maintenance requirements. To identify the most vulnerable areas, new driving rain indices are calculated for Ireland using observed and modelled climate scenario data in conjunction with ISO 15927-3:2009 'Hygrothermal performance of buildings – calculation and presentation of climatic data – part 3'. The results are mapped, showing increases in driving rain of up to 6% in the most vulnerable zones by 2060. Adaptive actions recommended include modifications to the existing building regulations regarding weather proofing.

Unlike other more urbanised European countries, approximately 40% of the population of Ireland lives in rural areas in individual dwellings not connected to mains sewerage. This has led to over 400,000 septic tank systems operating in Ireland, with consequent effluent management issues. On-site wastewater treatment systems are considered one of the principal sources of groundwater pollution in rural areas, and increases in winter precipitation could reduce septic tank efficiency, increase zones of groundwater vulnerability and thus severely restrict future construction of once-off housing in rural parts. To identify zones of potential vulnerability, septic tank densities are calculated and then overlain with modelled climate data and current groundwater levels. Several vulnerable areas are identified, principally in the west. Adaptive actions recommended include tighter planning restrictions in rural construction policy.

It can be concluded that climate change will have an impact on the construction industry in the areas of driving rain and effluent management. Increases in driving rain will necessitate changes in materials and practice. Effluent management may lead to planning restrictions and have implications for settlement policy regarding individual housing vis-à-vis clustered development.