We study the impact of the constraint on $|\dot{G}|/G|$ from Lunar Laser Ranging on "nonlocal gravity", i.e. on models of the quantum effective action of gravity that include nonlocal terms relevant in the infrared, such as the "RR" and "RT" models and the Deser–Woodard (DW) model. We elaborate on the analysis of Barreira et al. and we confirm their findings that (under plausible assumptions such as the absence of strong backreaction from non-linear structures), the RR model is ruled out. We also show that the mechanism of "perfect screening for free" suggested for the DW model actually does not work and the DW model is also ruled out. In contrast, the RT model passes all phenomenological consistency tests and is still a viable candidate.