Supplementary Information

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SI 1 – concentrations of alkali and alkaline earths, phosphorus and silicates for larch biochar mixed cold with wood ash (WA) and sintered with wood ash (WAS)

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### SI 2 - XRD peaks and intensities of hydroxylapatite, calcite and kalcinite for larch biochar sintered with wood ash (WAS)

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### SI 3 – Eluate pH measurements for wood ash mixed cold with larch biochar (WA), wood ash mixed cold and granulated to <3mm (WAGr), wood ash sintered to larch biochar (WAS) and wood ash sintered to larch biochar and granulated to <3mm (WASGr) mg/L when rinsed by 0mL to 800mL of deionised water
SI 4 – FTIR spectra of larch biochar sintered with wood ash before rinsing with deionised water (WAS) and after rinsing with 800mL of deionised water (WASR) and larch biochar mixed cold with wood ash before rinsing with deionised water (WA) and after rinsing with deionised water (WAR)
SI 5 - Immobilisation by wood ash mixed cold with larch biochar (WA), wood ash mixed cold and granulated to <3mm (WAGr), wood ash sintered to larch biochar (WAS) and wood ash sintered to larch biochar and granulated to <3mm (WASGr) mg/L when rinsed by 0mL, 200mL and 800mL of (A) lead, (B) copper, (C) zinc and (D) cadmium. The concentration of metals in solution was 10 mg/L.