

**Supplementary Table 3 | Three-dimensional soil pore-network properties. Values are means  $\pm$  s.d. (n = 3 independent cores). The 2019 original-soil cores are an independent pre-treatment reference; the other rows are 2025 endpoint treatments.**

| State                | Total pores    | Total throats   | Isolated pores | Isolation rate (%) | Average coordination | Maximum coordination |
|----------------------|----------------|-----------------|----------------|--------------------|----------------------|----------------------|
| Original soil (2019) | 5233 $\pm$ 345 | 32.3 $\pm$ 5.9  | 5196 $\pm$ 327 | 99.30 $\pm$ 0.36   | 0.0138 $\pm$ 0.0020  | 5.3 $\pm$ 1.2        |
| CK                   | 4059 $\pm$ 191 | 21.0 $\pm$ 5.3  | 4018 $\pm$ 175 | 98.99 $\pm$ 0.75   | 0.0023 $\pm$ 0.0005  | 3.0 $\pm$ 1.0        |
| C0B0                 | 3094 $\pm$ 247 | 64.3 $\pm$ 13.1 | 3053 $\pm$ 244 | 98.68 $\pm$ 0.11   | 0.0301 $\pm$ 0.0055  | 6.7 $\pm$ 2.5        |
| C0B1                 | 2606 $\pm$ 251 | 37.7 $\pm$ 7.4  | 2580 $\pm$ 247 | 98.99 $\pm$ 0.16   | 0.0178 $\pm$ 0.0005  | 6.3 $\pm$ 2.5        |
| C1B0                 | 1606 $\pm$ 149 | 52.0 $\pm$ 14.9 | 1566 $\pm$ 151 | 97.51 $\pm$ 0.73   | 0.0538 $\pm$ 0.0060  | 7.7 $\pm$ 1.2        |
| C1B1                 | 1463 $\pm$ 201 | 62.3 $\pm$ 2.1  | 1411 $\pm$ 182 | 96.55 $\pm$ 1.26   | 0.1107 $\pm$ 0.0079  | 7.7 $\pm$ 1.5        |