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Risks of biointrusion: small mammal and insect implications on isolated waste cover systems
M Barney* and J Dillon, *Cedar Creek Associates, Inc.*, *Fort Collins, Colorado, U.S.*
mbarney@cedarcreek.app

There is increasing interest from a regulatory perspective to quantify the impact of small mammal and insect biointrusion on reclaimed cover systems, yet there remains a general lack of research into these effects and how to model them. Great emphasis is placed on the characterization of hydraulic and geotechnical properties of earthen cover materials. However, available literature indicates that the creation of macropores by rooting vegetation and animal burrows significantly affect hydraulic properties of covers within a few years of implementation. Burrowing animals can affect cover performance by creating preferential pathways affecting percolation rates, exposing waste materials through castings, introducing waste material into the food chain by ingestion, and disturbing soil structure which may encourage erosion.
Current models that attempt to describe vegetation biointrusion have shown that field evapotranspiration (ET) rates are lower, hydrologic conductivity (Ks) increased, and water infiltration increased significantly with frequent rainfall at high intensity in areas of increased biointrusion. Though vegetation and animal biointrusion may work synergistically, models must be able to quantify animal biointrusion individually, as burrows are far more variable than rooting vegetation. Burrows range in width, depth, and density according to species, generally ranging from badgers and larger predators to termites and ants. A qualified ecologist/wildlife biologist should be involved in engineering design and hydraulic modeling of cover systems to conduct risk assessment of biointrusion. The risk assessment considers the plants, animals, and insects expected to inhabit the reclaimed cover system, quantifies the characteristics of the types of burrows they establish, and proffers findings on whether the anticipated biointrusion could significantly impact cover performance.