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Climate Adaptation Control Technologies for Urban Spaces - CACTUS

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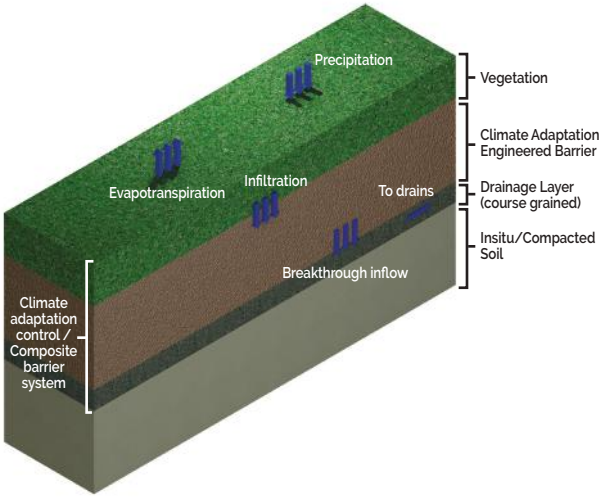
Climate Adaptation Control Technologies for Urban Spaces - CACTUS

One of the UK's emerging priority areas of curiosity-driven research needing immediate and sustainable solutions is the impacts of climate change on geo-infrastructure in urban areas. Soil supporting or surrounding the infrastructure is exposed to the dynamic nature of the atmosphere in the form of extreme temperatures or unusual precipitation events. CACTUS aims at developing novel composite barrier systems for urban spaces in order to limit the severe impacts of "wet and dry", "flooding", and "freeze and thaw" on geo-infrastructure. The barrier will be designed to provide increased water holding capacity, reduce impact on subsurface soil strata, and support vegetation. While the project partners work on identifying a range of potential soil types for the barriers and suitable vegetation to enhance transpiration, our researchers at National Green Infrastructure Facility (NGIF) will test the barrier systems in large-scale experiments by applying a series of climate scenarios to represent current and future weather patterns.



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Climate Adaptation Control Technologies for Urban Spaces (CACTUS)

The CACTUS project is an ongoing research project that is investigating the development of "climate adaptation composite barrier systems" capable of limiting the impact of a changing environment on buried geo-infrastructure, such as retaining walls and foundations. Composite barrier systems consist of an upper fine-grained layer for water retention, overlaying a coarse-grained capillary break layer that controls vertical infiltration of soil moisture (Figure 1). Climate change results in more extreme precipitation events and increased seasonality with warmer summers and colder winters, leading to severe flooding, extreme drying, freezing and thawing. Additionally, the costs of damage due to shrink/swell movements on clay soils have resulted in economic losses of over £1.6 billion in the UK during drought years. Through water retention and through mitigating against shrink swell movements in underlying materials, composite barriers offer a sustainable solution to the protection of geo-infrastructure against the effects of climate change.

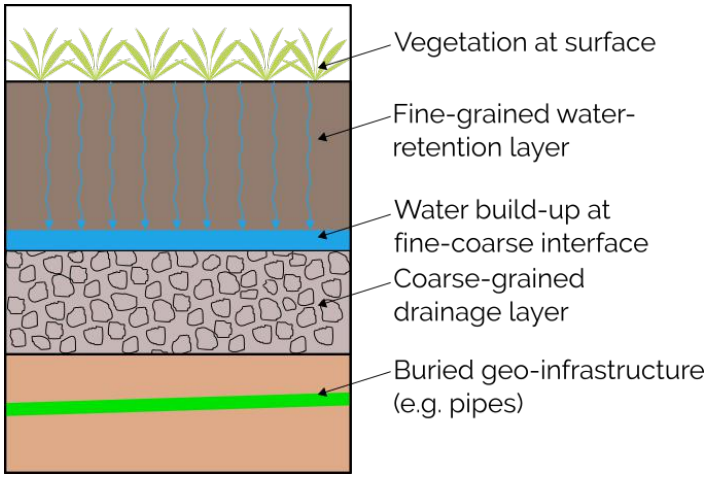

Figure 1. Composite barrier system used to protect buried geo-infrastructure from shrink-swell movements.

Field-scale testing of composite barrier systems will utilise a large-scale lysimeter at the National Green Infrastructure Facility, Newcastle University. This will enable testing of the soil-plant-atmosphere interactions on barriers of different geometries, in order to assess and make recommendations for the effectiveness of capillary barriers.

To find out more, see a presentation on composite barrier systems here: https://www.youtube.com/watch?v=yCg-_xlDG7Y

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