# Maximizing Urban Green Roof Potential Through the Understanding of Microbiome Composition

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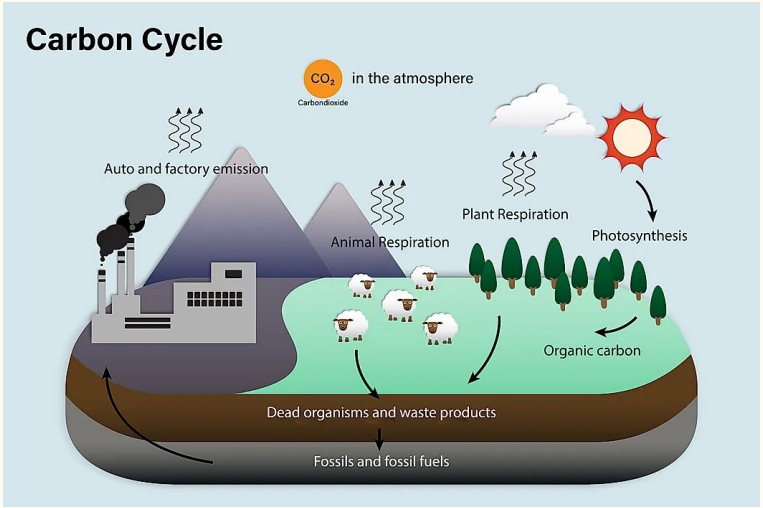
# Presentation Outline

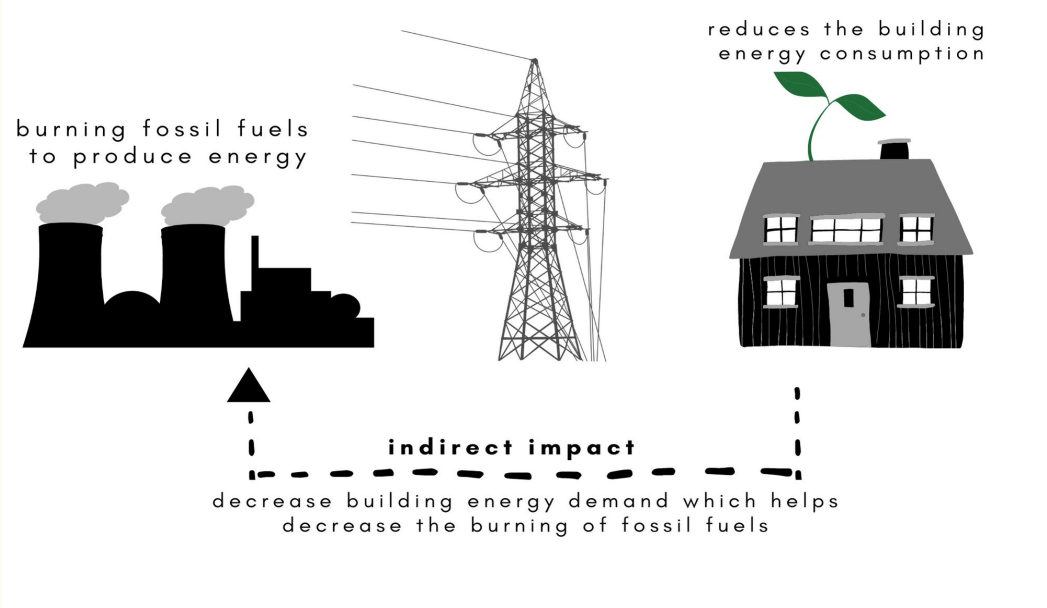
I. Why Green Roofs are Important
   A. Carbon Cycle & Climate Change
II. Methods of Study
III. Results
   A. Shallow vs. Deep System
   B. Effect of Light & Exposure
IV. Implications
V. Future of Green Roof Soil Microbial Research

(*Is a green roof sustainable?*, 2021)

# Carbon Cycle & Green Roofs

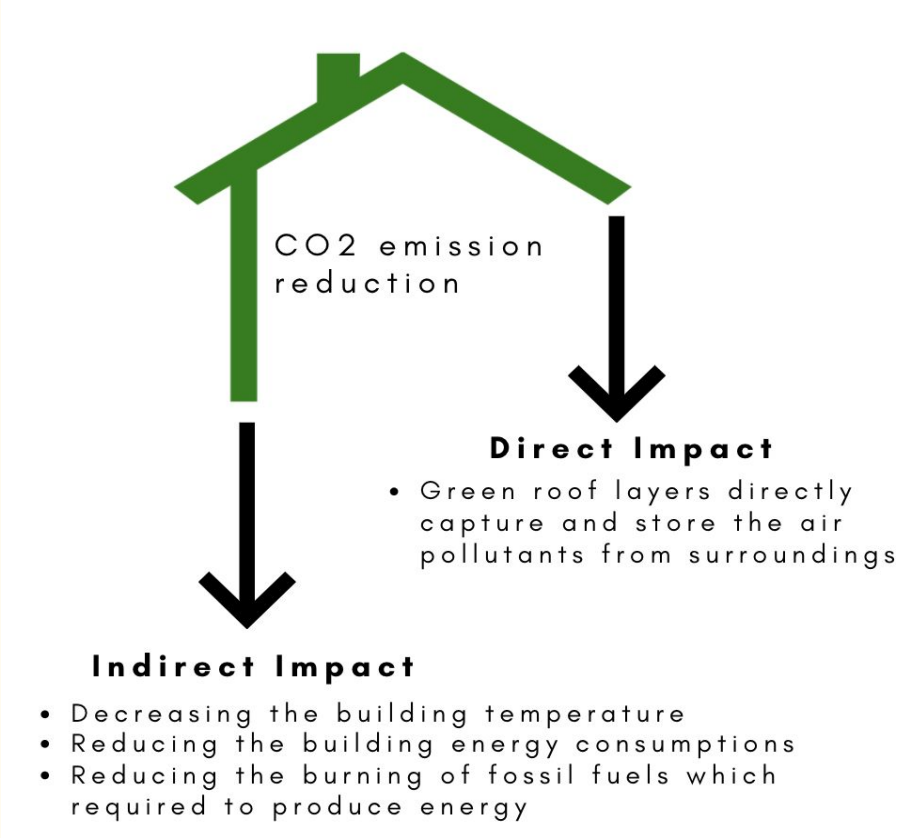
Why Green Roofs are Important




(Dodd, 2021, April 26)

Redesigned/Inspired by (Shafique et al., 2020)

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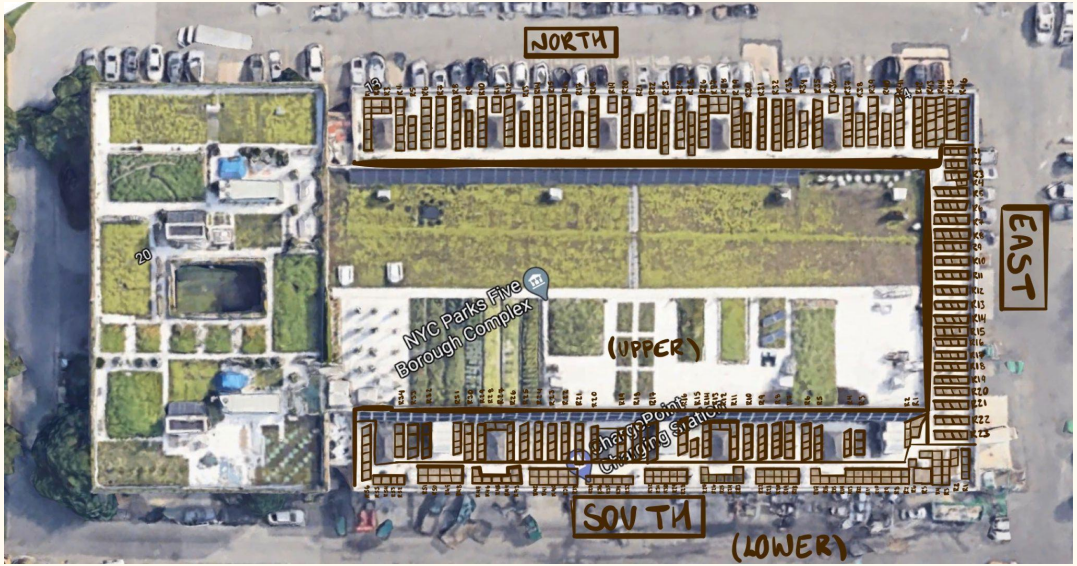


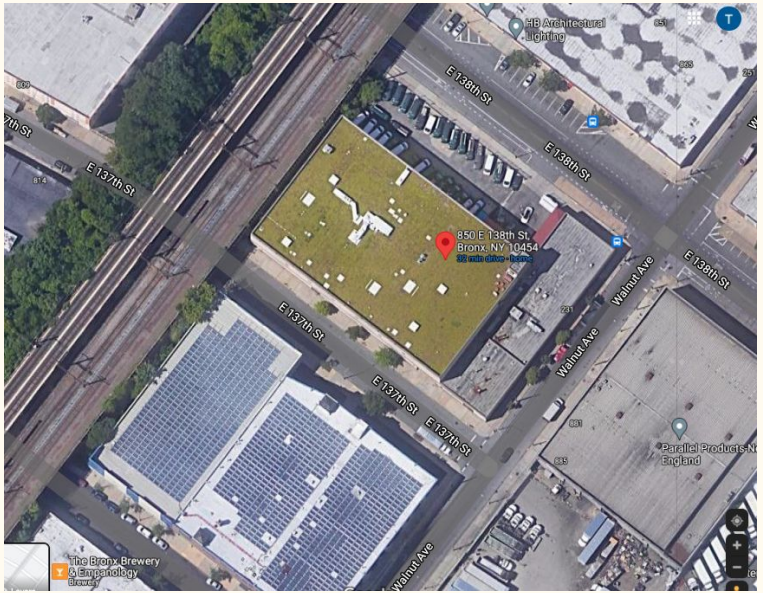
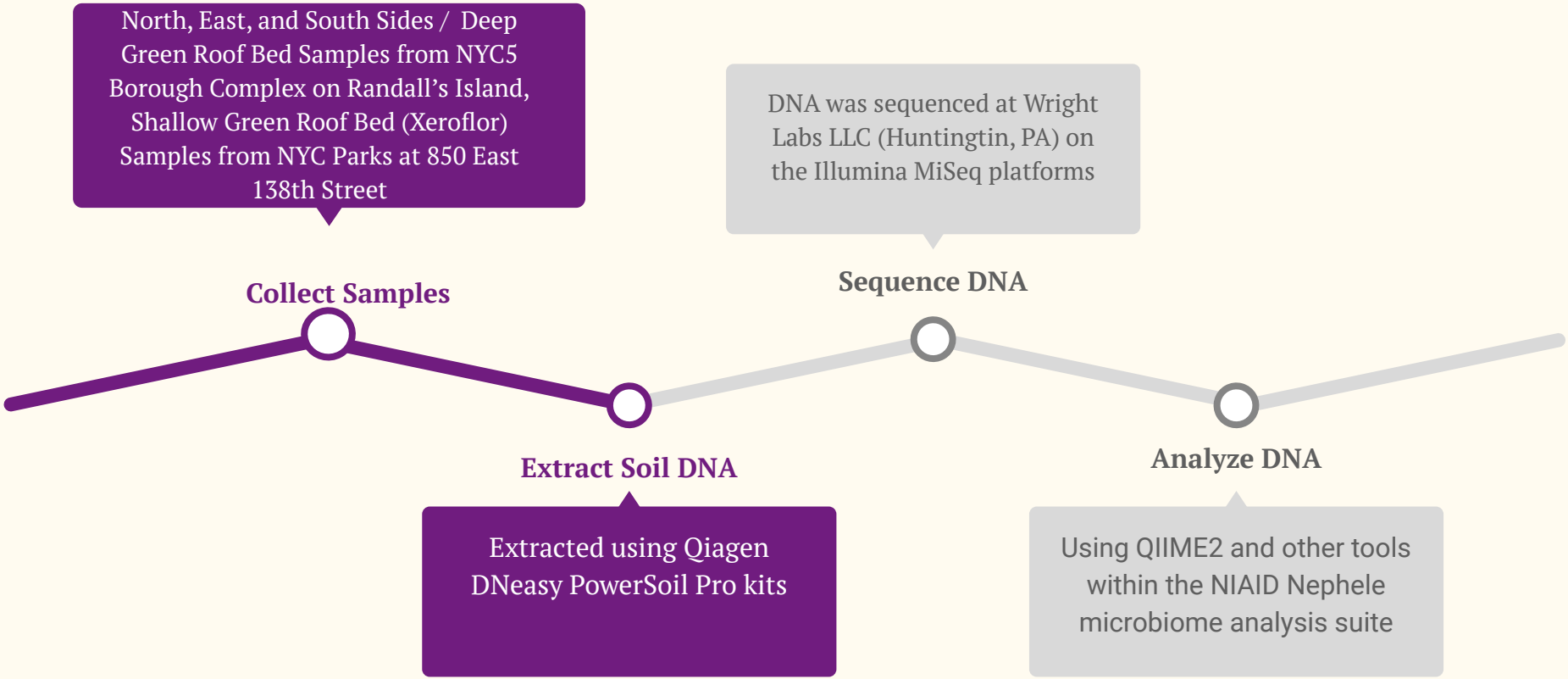




**Figure 1.** An aerial image of NYC Borough 5 Complex illustrating how samples were labelled and collected, and b) the NYC Parks at 850 East 138th Street


North, East, and South Sides / Deep Green Roof Bed Samples from NYC5 Borough Complex on Randall's Island, Shallow Green Roof Bed (Xeroflor) Samples from NYC Parks at 850 East 138th Street
Collect Samples
Extract Soil DNA
Extracted using Qiagen DNeasy PowerSoil Pro kits
DNA was sequenced at Wright Labs LLC (Huntingtin, PA) on the Illumina MiSeq platforms
Sequence DNA
Analyze DNA
Using QIIME2 and other tools within the NIAID Nephele microbiome analysis suite

# Shallow vs. Deep Systems



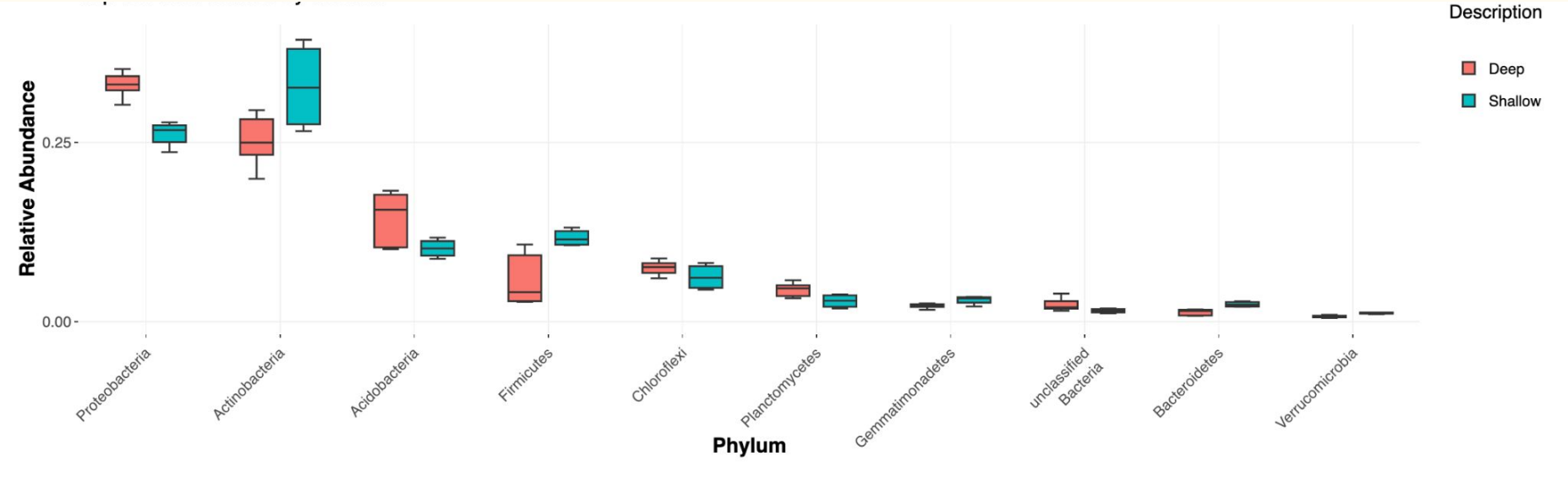
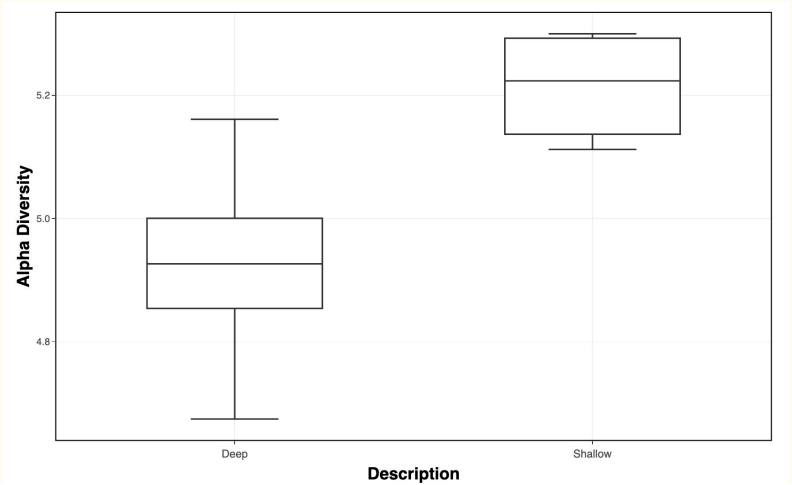



**Figure 2.** Relative abundance chart of the two different green roof beds (shallow & deep), generated using Nephele & Microbiome DB



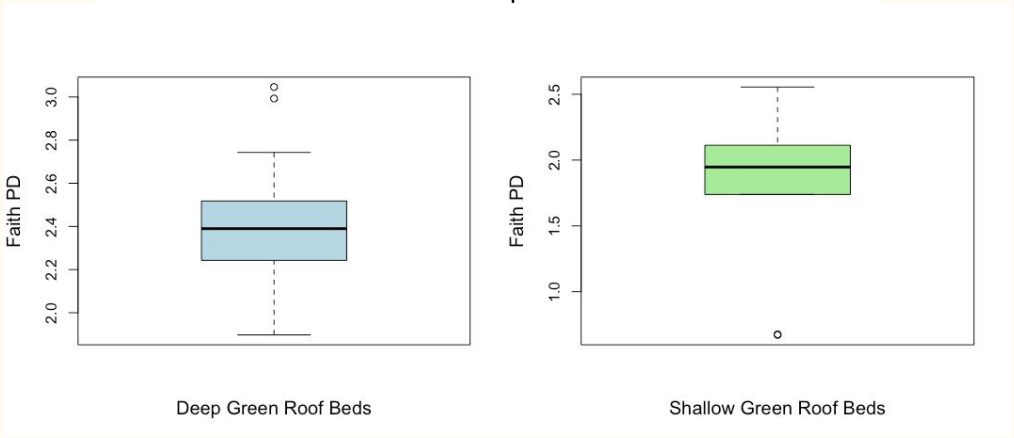




**Figure 3. a)** Shannon Alpha Diversity box plot comparing green roof beds, generated using Nephele & Microbiome DB; b) Deep green roof bed Faith PD; c) Shallow green roof bed Faith PD, generated in R Studio

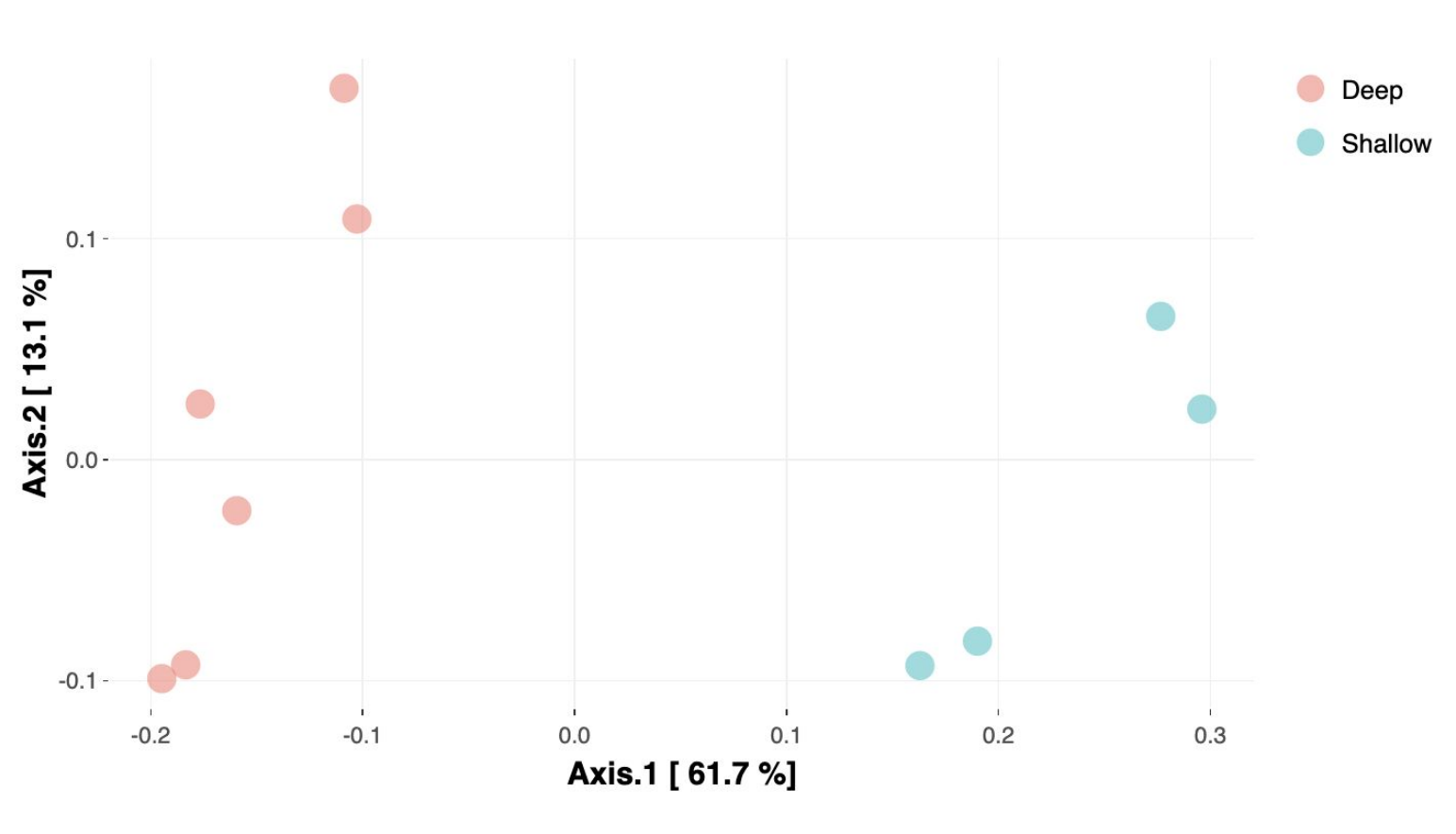



**Figure 4.** Bray-Curtis Beta Diversity plot comparing green roof beds, generated using Nephele & Microbiome DB

# Effect of Light & Exposure

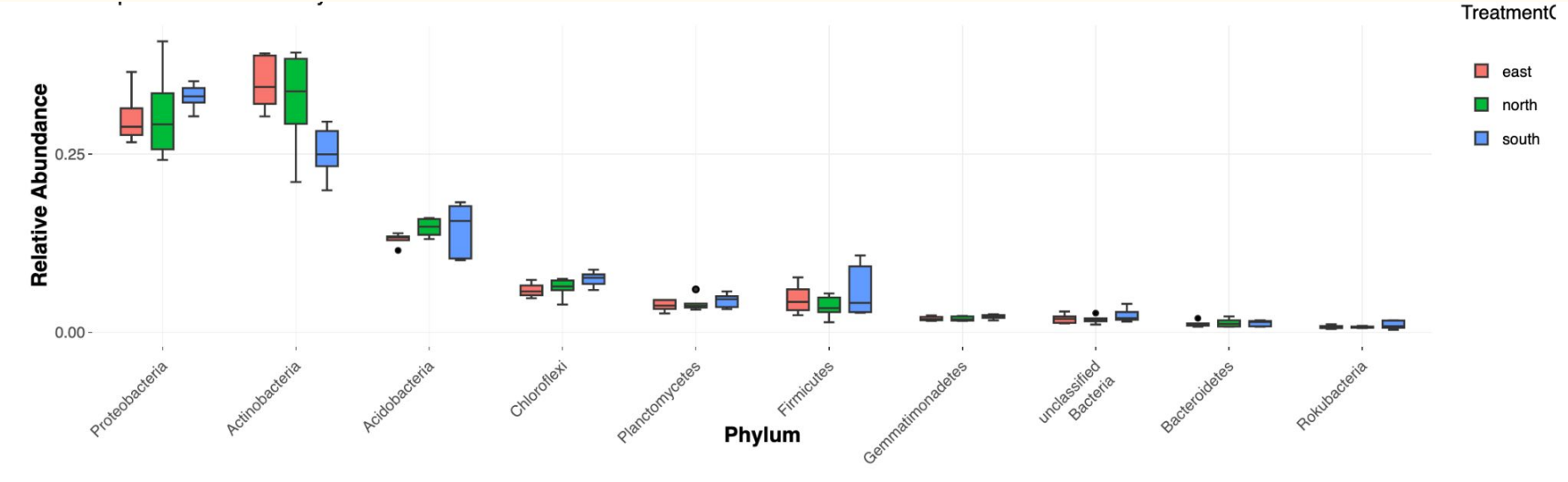



**Figure 5.** Relative abundance chart comparing building orientation taxa in deep green roof beds, generated using Nephele & Microbiome DB

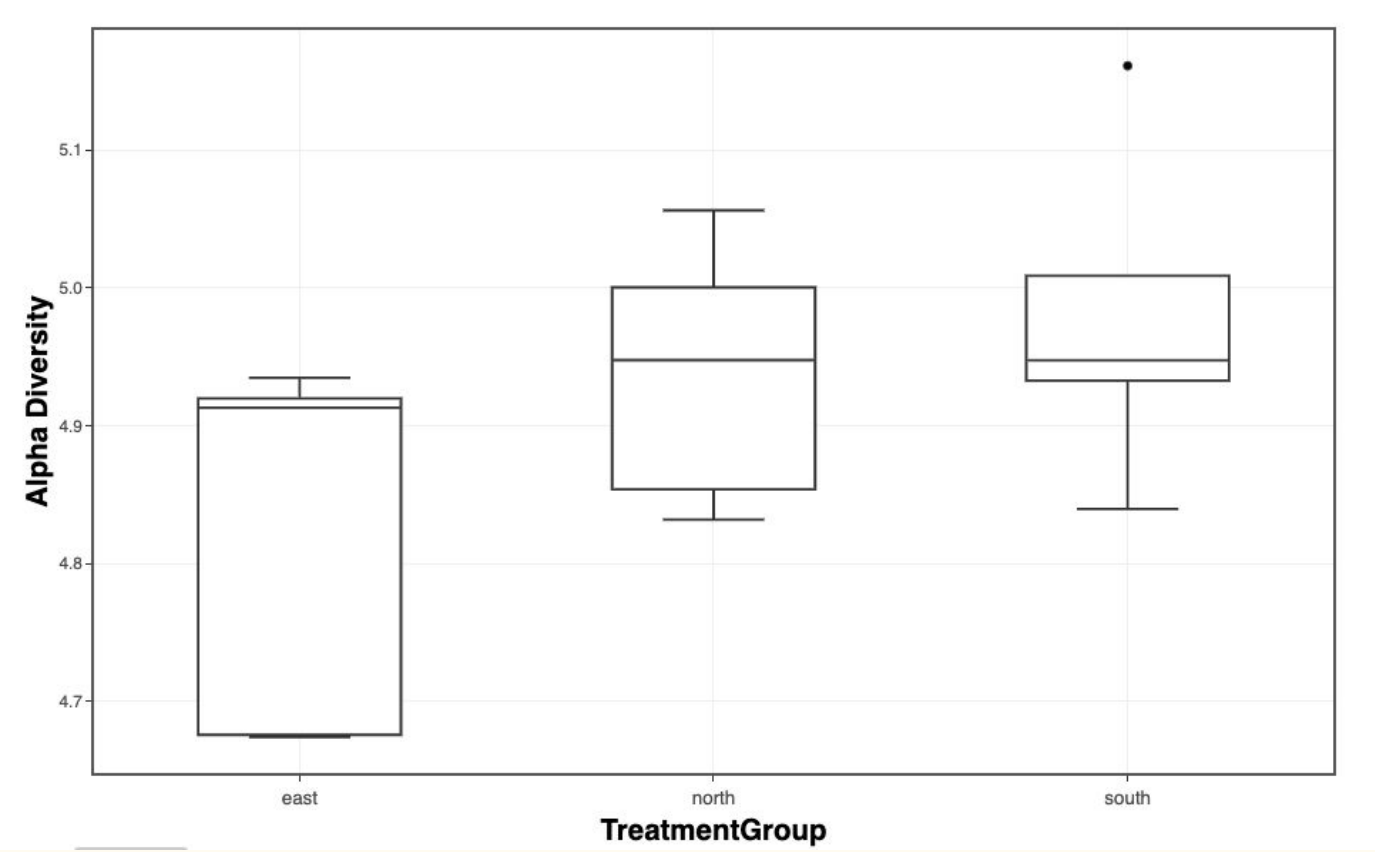



**Figure 6.** Shannon Alpha Diversity box plot comparing building orientations in deep green roof beds, generated using Nephele & Microbiome DB

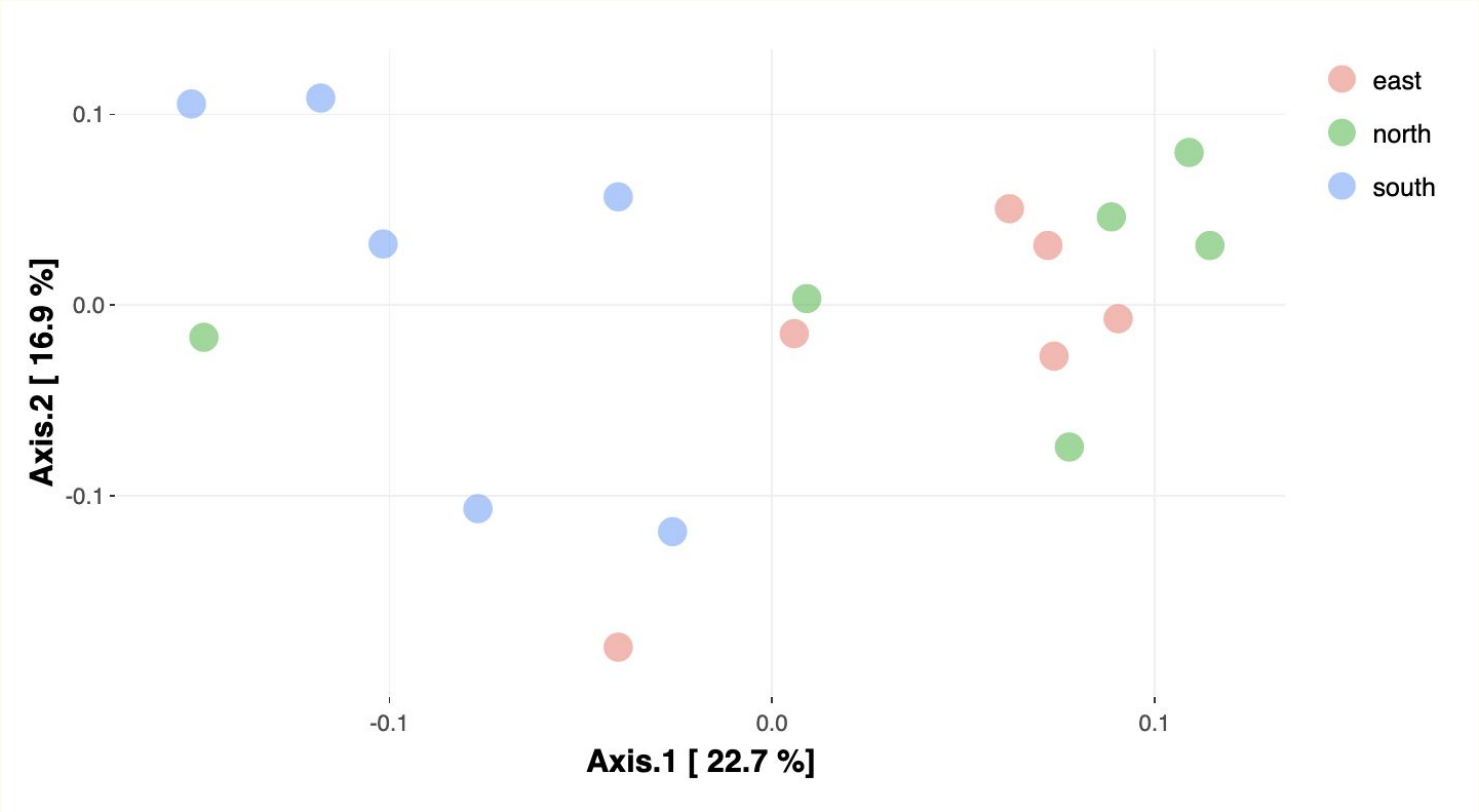



**Figure 7.** Bray-Curtis Beta Diversity plot comparing building orientation in deep green roof beds

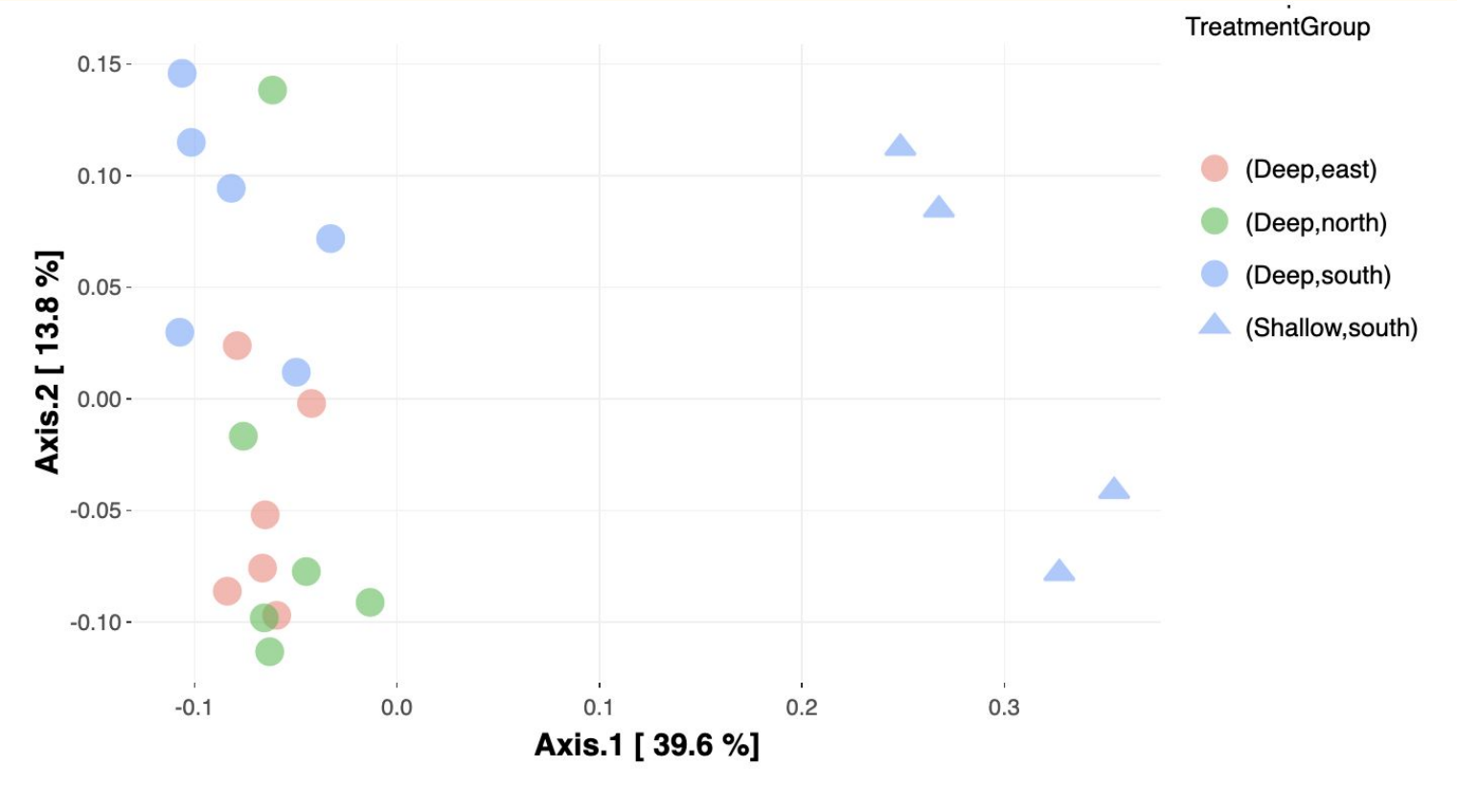



**Figure 8.** Bray-Curtis Beta Diversity plot comparing Deep beds, Shallow beds, and orientation generated using Nephele & Microbiome DB

# What's Next?

- Explaining Discrepancies
- Diversity at Genus or Species Level
- Comparing Results
- Intermediate Disturbance Hypothesis

(*Soil Testing - Oldham County,* 2017)

# Questions?

# Acknowledgements & References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