

## 1. INTRODUCTION

Soil has many different attributes, making it potentially useful as physical evidence. However, soil is not currently routinely used in this way. This project investigated whether soils in Edinburgh city could be differentiated into land use vegetation (LUV) classes across three city locations using soil colour as a relatively simple measure.



## 2. METHODS

- Three distinct urban locations within Edinburgh were selected: Heriot Watt University Campus, Corstorphine and The Braids
- Within each location, 4 LUV classes were chosen to represent potential urban crime sites: roadside lay-bys, municipal park flower beds, woodland and scrubland
- Four replicate surface soil samples were taken (0-2cm depth) at each location
- Colour was determined on a ground portion of air dried soil using a spectrophotometer (Konica Minolta CM2600d) over the 360 – 740 nm wavelength range

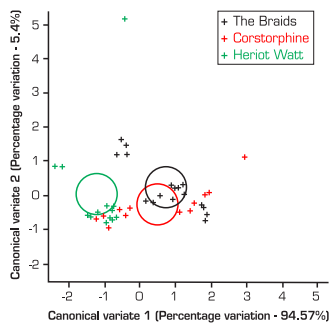


## 3. DATA ANALYSIS

- Data were expressed as the CIELAB notation using SpectraMagic software (Konica Minolta)
- The colour variables express colour in 3-D space as lightness (L), red-green chromacity (a\*) and blue-yellow chromacity (b\*)
- The L, a\*, b\* colour variables were used in a Canonical Variate Analysis (CVA) to assess a) if soil colour could be used to discriminate between the specific city locations, b) if LUV classes within the locations could be discriminated
- CVA looks to minimise the 3-D space within sample groups, while maximise the 3-D space between different groups. It represents this in 2-D, accounting for as much of the overall multivariate data variability

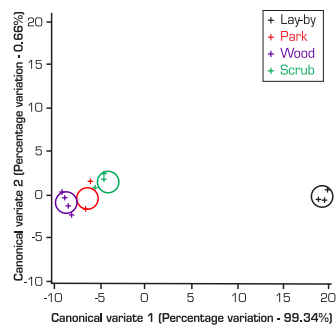
## 4. RESULTS

### a) Between Location

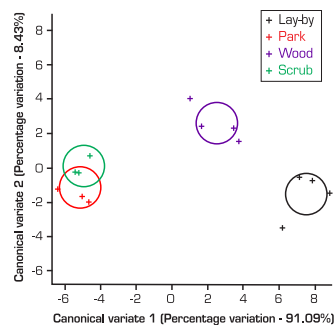


- **Between LOCATION:**  
No clear differentiation

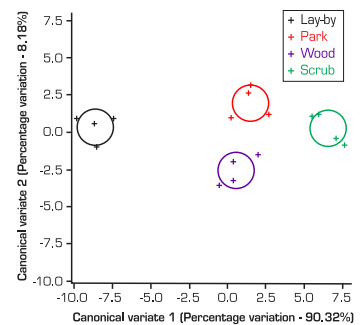
### b) Between LUV



- **Heriot Watt:** lay-bys were differentiated



- **Corstorphine:** the lay-bys and woodlands were differentiated



- **The Braids:** all contrasting LUVs were discriminated

## 5. CONCLUSIONS

- Colour was a poor indicator of city location, failing to clearly discriminate between the three urban sites
- The ability to discriminate between LUV classes varied within specific Edinburgh locations
- Roadside lay-bys could be clearly discriminated from vegetated sites at all locations, probably due to man's alteration of the mineral component and a lower amount of organic matter
- Where the location was relatively young, with undeveloped vegetation, differentiation between LUVs was poor (Heriot Watt)

- Where the maintenance of parklands was neglected, there was difficulty in discriminating park flower beds from scrubland (Corstorphine)
- At the Braids loci, a well established and well managed region, all 4 LUV could be discriminated with confidence
- Soil colour could prove a rapid and inexpensive preliminary screening method to reduce the number of samples requiring more detailed and costly comparison
- This type of comparison could be particularly applicable for intelligence work in established areas, but is likely to have limited evidential value
- Further work is required, with fuller replication to address site specific variability