

Physical Properties of Slope Soil from the Highways Department

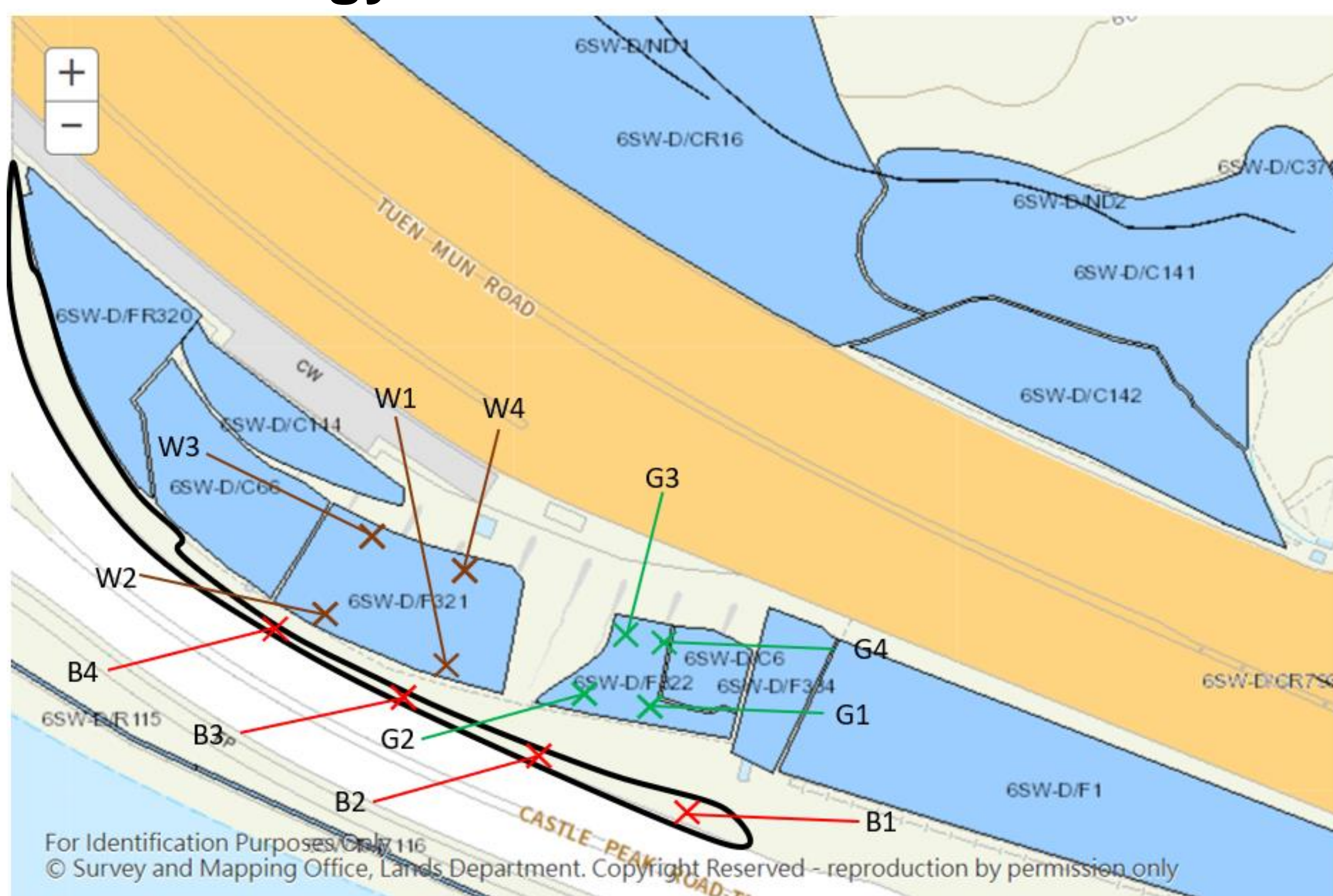
Miss HUI Man Yui, BSc (Hons) in Horticulture, Arboriculture and Landscape Management,
Faculty of Design and Environment

Supervisor: Dr ZHANG Hao Allen, Associate Professor

Research Outline

The slope stability of man-made slopes near the highway department is important for road safety. Natural terrain hazards could be induced by poor soil quality. Soil physical properties determine soil quality. This research aims to: (1) quantify the soil physical properties of highway slopes and (2) quantify the relationship between highway slopes and vegetation. There was a total of 12 soil samples collected on a slope near the Tuen Mun Road Interchange (To the Tuen Mun direction). The soil samples were measured for pH value, soil electrical conductivity, moisture, colour, texture, bulk density, and porosity. Most of the soil samples were sandy loam soil. The average of pH value on grassland soil is 7.67. The pH value of grassland and woodland slope is slightly alkaline. Flat ground has better water holding ability than slopes. All samples have soil conductivities that are less than 2. The soil on the highway slope is not affected by soil salinization or compaction. Improvements in soil quality and vegetation planting may be offered based on the findings to improve the slope stability in an environmental-friendly way, which can prevent the natural terrain hazards from affecting road safety. This research was useful for soil slope and highway slope maintenance.

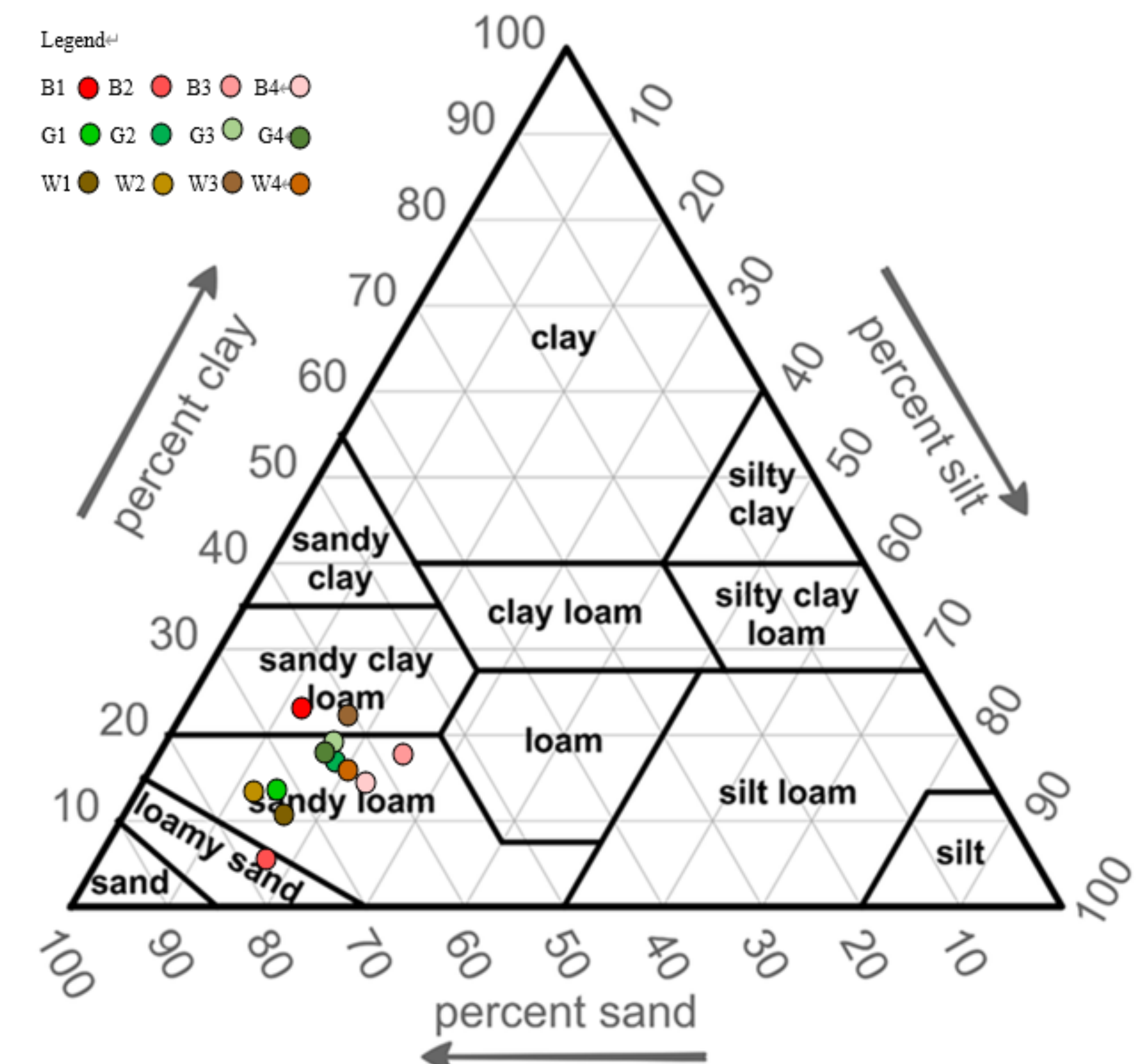
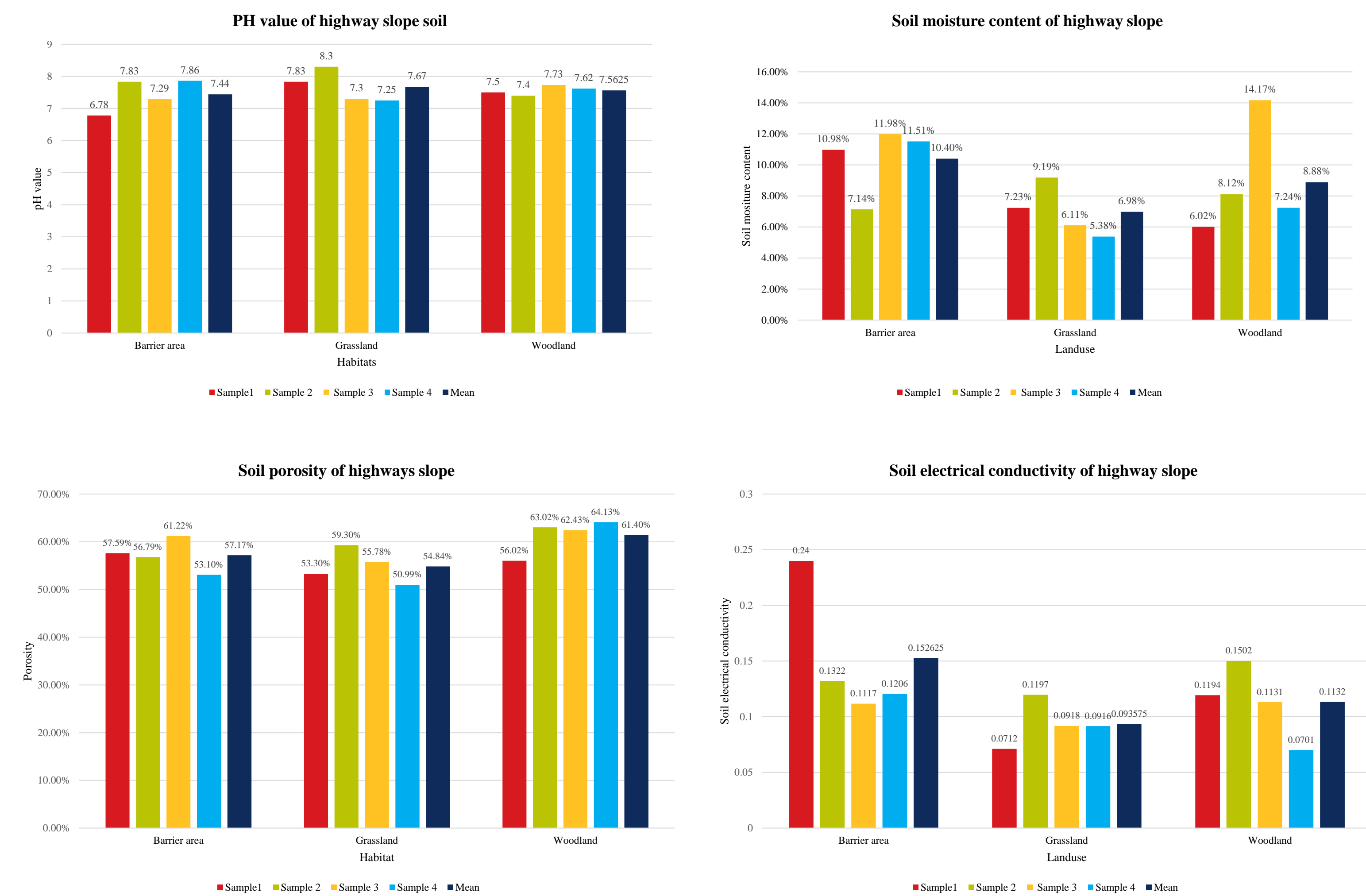
Methodology



- Study area: slope between Tuen Mun Road, New Territories, Circular Road, and Castel Peak Road-Tsing Lung Tau.
- Types of habitats found on the site: grassland (G), woodland (W), and barrier area (B).
- Number of soil samples: 12
- Data of soil physical properties collected: pH value, soil electrical conductivity, moisture, colour, texture, bulk density, and porosity.

Results

- PH value of all samples: neutral to slightly alkaline
- All soil samples are non-saline soils
- Woodland slope soil has over 60% of porosity on average
- The grassland slope soil has the least moisture among the three habitats (6.977%)
- Soil texture class of samples: Sandy clay loam, sandy loam, and loamy sand
- All samples had bulk densities under 1.6 g/cm³



Discussion

- Flat ground has better water-holding ability than slopes
- All samples are non-saline soil
- Three different habitats have relatively little overall soil salinization and negligible effects on plant growth.
- The likelihood of the soil becoming flooded is considered to be lower.
- The pH value of the barrier area is closest to the ideal pH value.
- Soil of flat ground is available for more soil nutrients for plant growth.
- The soil samples are overall brown with well aeration and drainage.
- The soils of the 3 habitats are loose and porous enough for plant root development.
- Woodland slope has a lower bulk density and a higher porosity than grassland slope .

Conclusion

To conclude, woodland slopes and the crest of slopes have better physical properties. Grassland slope and the toe of the slopes require more daily irrigation to maintain an optimum moisture level. Future studies on identical slope settings but various habitats, gradients, and plant species can be considered to acquire a more comprehensive overview of slope vegetation selection. For highway slopes, the soil chemical characteristics can also be investigated. In order to improve highway slope maintenance and the local government's greening programs, this research deepens our understanding of the soil found on local highway slopes.