

FACULTY OF ENGINEERING & IT

**INVESTIGATION OF INFLUENTIAL FACTORS
ON HEAVY METAL CONCENTRATION IN
URBAN ROADSIDE SOIL**

**A thesis submitted in fulfilment of the requirement of the degree of Doctor of
Philosophy**

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as part of the collaborative doctoral degree and/or fully acknowledged within the text.

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ABSTRACT

Previous studies have found that there are a variety of factors that influence heavy metal concentrations in roadside soil. The first aim of this study was to investigate heavy metal (Pb, Zn, Cu, Cd, Cr and Ni) distribution patterns in terms of observing the influence by different factors such as soil type, soil depth, rainfall events and distance from traffic, in the roadside soil. In addition, the examination of the influence of these factors on the Pb isotopic ratio ($^{206}\text{Pb}/^{207}\text{Pb}$) variation in different chemical fractions is conducted also to discriminate between anthropogenic and natural sources.

One hundred and eighty soil samples were collected over more than one year at 1m, 5m and 10m from the road during pre-rainfall and post-rainfall conditions in Miranda Park, Sydney, Australia. This research area was selected for sampling as it is a unique site and allowed for the investigation at the one location of the critical influential factors. Each soil sample was analysed for total heavy metal concentration and chemical fractions were extracted by sequential extraction. The data was statistically analysed using a regionalisation technique to allow discrimination between natural and influential factors variability. Hence, this study statistically investigates the distribution of heavy metals in urban roadside soils (topsoils and subsoils) derived from different geologies at varying perpendicular distance from the road and the concentration changes of heavy metals in those soils pre- and post-rainfall periods.

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