

## Pollution from roads - Road sweepings - Analysis Results

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Mike Foley supplied me with a large sample of the road sweepings for analysis from Shelford Road. I took a homogenised 500g sub-sample and carried out a rudimentary **Particle Size Analysis**.

I screened off the largest (>10mm) clasts first. This fraction contained visible glass, plastic, organics and a quantity of animal (dog?) hair. I then screened off the >2mm fraction. I subsequently used the <2mm fraction for the LOI and chemical analyses below.

I was also able to quantify the finer fractions.

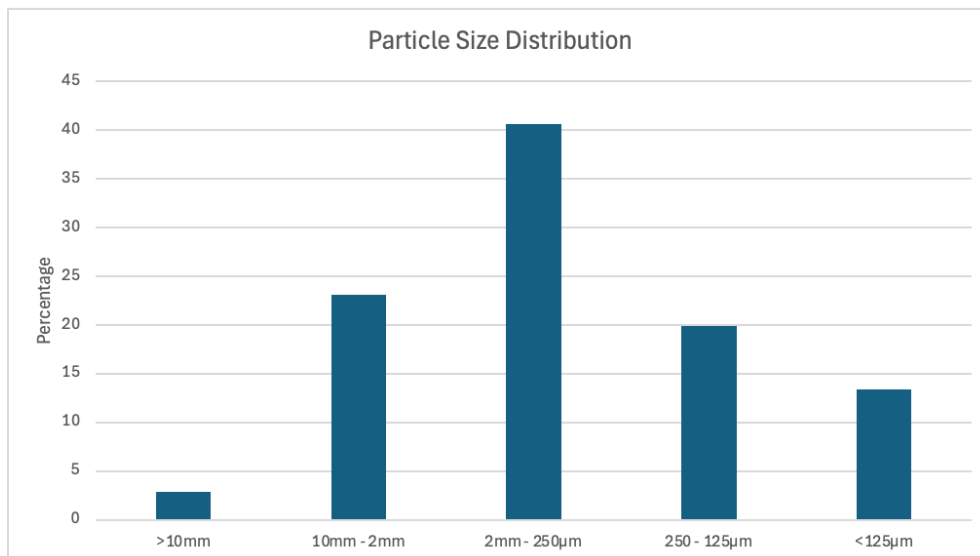
Medium-coarse sand (2mm - 250 $\mu$ m) comprised ca.40% by weight and the larger clasts (>2mm & >10mm) comprised ca.25%, leaving the fines (<250 $\mu$ m) at ca.35%.

I also used a Neodymium magnet to remove and quantify the Magnetic Component from each fraction. Most of this appeared to be rust debris from vehicles. Whilst the Magnetic Component was ca.5% overall, it was most common in the 10mm - 2mm fraction.

Radioactivity was measured for each fraction, but was not above the background level.

### Particle Size Analysis

<i>Fraction</i>	<i>All Clasts</i>		<i>Magnetic Component</i>	
	<i>Weight (g)</i>	<i>Percentage</i>	<i>Weight (g)</i>	<i>Percentage</i>
>10mm	14.57	2.91	0.80	0.16
10mm - 2mm	115.67	23.13	14.10	2.82
2mm - 250 $\mu$ m	203.29	40.66	4.60	0.92
250 - 125 $\mu$ m	99.69	19.94	2.90	0.58
<125 $\mu$ m	66.78	13.36	2.75	0.55
<b>TOTAL</b>	<b>500.00</b>		<b>25.15</b>	<b>5.03 %</b>



**Loss-on-ignition (LOI) analysis** was carried out on the <2mm fraction.

This process involves heating a dried sample of known weight in a crucible to 550°C and then 950°C, and measuring the loss in mass at each temperature.

Silicate residue comprised almost 85% of the sample, and Chalk (CaCO<sub>3</sub>) made up almost 12%. Organic material (including plastics) were present at almost 4%.

#### Loss-on-ignition Analysis of Road Sweepings

<i>% Organic</i>	<i>%CaCO<sub>3</sub></i>	<i>% Silicate residue</i>
3.8	11.8	84.5

**Chemical analysis** was carried out on the supernatant formed by mixing 10ml of the <2mm fraction with 30ml of de-ionised water. Measurements were taken after 10 minutes settling.

The pH measurement was surprisingly alkaline at 8.52, and the Electrical Conductivity was fairly high (1540µS/cm) suggesting a loading of de-icing salt and other ionic solutes. It was startling to discover that the Dissolved Oxygen had fallen to ca.50%. A reference beaker of de-ionised water was measured at 100%.

Analysis using the Hanna IRIS meter gave a low Nitrate-N reading of just 0.7mg/l. However, the Phosphate-P reading was surprisingly high (0.46mg/l) and the Ammonia-N reading was higher still (3.55mg/l). The original attempt to measure Turbidity failed, but a 1:10 dilution gave a very high reading of 825 FTU.

#### Chemistry

pH	8.52
Electrical Conductivity µS/cm	1540
Dissolved Oxygen %	49.5
Nitrate-N mg/l	0.70
Phosphate-P mg/l	0.46
Ammonia-N mg/l	3.55
Turbidity 1:10 dilution FTU	825

#### In summary:

The relatively large amount of magnetic material in the road sweepings was an interesting result. The high potential for causing turbidity and low oxygen on the receiving watercourse is an important finding. The potential Phosphate and Ammonia loadings were a little unexpected, and also a fascinating revelation.