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Committee Environment Committee
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Background concentrations of common pollutants in soils in the Wellington Region

1. Purpose

To inform the Committee of the findings of an investigation undertaken in May and June 2003 into background concentrations of common pollutants in soils in the Wellington Region.

2. Background

Contaminated sites are defined in the Regional Plan for Discharges to Land for the Wellington Region as "sites at which hazardous substances occur at concentrations above background levels, and where assessment indicates it poses or is likely to pose an immediate or long term hazard to human health or the environment".

To ensure that sites classified as confirmed contaminated on the Selected Land Use Register conform with the definition for a contaminated site given in the Regional Plan, it was necessary to determine the background concentrations of common elements and compounds in soils around the Region. Previously, in order to determine whether sites are contaminated, the contaminant concentrations have been compared to background soil concentrations taken from Australian and New Zealand Environmental Co-ordinating Committee (ANZECC) guidelines. However, these guidelines are not specific to New Zealand, let alone our Region.

These common pollutant comprise of elements and compounds which are all present in nature, and their background concentrations will be dependent on the composition of the parent rock and natural processes such as bush fires and geothermal activity. It is through human activity that they exist at higher concentrations and this is when they pose a risk to health and the environment.

3. Strategic context

This project contributes to the achievement of the following Take 10 targets for the Region:

- No overall deterioration in the health of our soils;
- No significant deterioration of water quality in our key streams and rivers.

4. Project outline

The Region was divided into five areas based on the main soil types. Each of the soil types arises from a different parent rock and, therefore, was expected to contain differing concentrations of the contaminants. The five main types of soil identified in the Wellington Region were: -

- Type 1 - coastal and terrace soils north of Paekakariki, (sands);
- Type 2 - rugged axis soils associated with the greywacke bedrock;
- Type 3 - friable silt loams associated with recent alluvial soils of the floodplains (Hutt alluvium);
- Type 4 - recent alluvial sandy silty soils of the Wairarapa floodplains (Wairarapa alluvium);
- and Type 5 - eastern Wairarapa hill country siltstone and mudstone soils (mudstone/siltstone).

Soil samples were taken from forty sites around the Region. Sample sites were where no human activity has taken place – so the result should reflect the naturally occurring levels of contamination.

Samples were analysed for arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, zinc, total petroleum hydrocarbons (TPHs) and polycyclic aromatic hydrocarbons (PAHs).

5. Results

The main findings of the study were that background levels of heavy metals in the Region's five soil types were generally at the lower end of the range expected for uncontaminated soils.

There was little difference in the levels of arsenic, cadmium, copper and TPHs in the five soil types monitored. However, there were significant differences in the levels of soluble boron, chromium, mercury, nickel, lead and zinc.

Soluble boron levels were highest in the mudstone/siltstone soils; chromium and nickel levels were highest in the Wairarapa alluvium soils, and lead, zinc, and mercury levels were highest in the Hutt alluvium soils.

All soils had background levels of polycyclic aromatic hydrocarbons (PAH) that were less than the trigger values where existing toxicity data indicates that there is a possibility of environmental effects.

Total PAH was lowest for the mudstone/siltstone soils of the Wairarapa and highest for the alluvium soils. Historical bush fires or possibly deposition from traffic and household fires may have caused the higher background levels.

There are no guidelines for background concentrations for total petroleum hydrocarbons (TPH). None of the TPH concentration detected exceeded any of the health or environmental protection criteria in the oil industry guidelines.

6. Application of results

The project has established basic datasets defining the concentration ranges of common contaminants in the five main soil types in the Region. These datasets are at present limited due to the small sample size. However, as more data is obtained they will become more robust.

All sites classified as Confirmed Contaminated on the Selected Land Use Register have been assessed against the background concentrations to ensure they are appropriately classified.

The results of this investigation have enabled us to more confidently classify sites as contaminated. This is especially important where site investigation results show elevated contamination concentrations and the site is located in an environmentally sensitive location.

The results can also be used to set remediation standards. For example, if a site owner wanted to clean up their site to an uncontaminated state, and have this status reflected on the Selected Land Use Register, the data obtained in this project would provide the basis for setting clean-up levels.

This information may also help our Consents Management staff in assessing the environmental affects of applications to discharge contaminants to land.

This information is also being used to interpret the results of our stormwater investigation. It may enable us to determine whether the contaminants occurring in the stormwater are natural or are due to activities occurring on the land.

7. Further work

A few anomalies were encountered during the investigation, one of which was in Kaitoke Regional Park where an elevated concentration of mercury was detected. It is proposed to resample the soils in this area to determine whether this is the natural concentration or due to human activity.

To make the datasets more robust further rounds of sampling and analysis of each of the soil types are required. The range of contaminants studied needs to be expanded to cover other common contaminants such as PCP, DDT and

other Agri-chemicals. This will assist in the assessment of any timber treatment sites and agricultural sites, such as sheep dips and horticultural sites. This work is planned in stages, the investigation of the anomalies at Kaitoke and further sampling and analysis of the Type 1 soils - Kapiti Coast - are programmed for this financial year.

The study covered the five main soil types in the Region. However, there are further soil types, generally located in the eastern Wairarapa, which we will be investigating in the long term.

8. Next steps

The National Waste Strategy (Ministry for the Environment 2000) set targets for contaminated sites. The first of these requires that by 2008, all sites on the Hazardous Activities and Industries List (HAIL) will have been identified and that 50% of these sites will have been subject to a rapid screening system in accordance with the Ministry's guidelines. The sites identified in the HAIL list are not necessarily contaminated, but there is a higher probability of contamination being present.

As these sites are identified they will be recorded on the Greater Wellington Selected Land Use Register. We have investigated the sites we own, manage, and identified sites in five hazardous activity and industry sectors. Currently there are approximately 1500 contaminated, potentially contaminated and remediated sites recorded on the register. It is expected that this number will rise significantly as we begin to identify the 53 hazardous activity and industry sectors in the HAIL list. This will be a mammoth task and we have less than four years to complete it.

To help in achieving the National Waste Strategy targets, the MfE is developing a series of five Contaminated Land Management Guidelines. The first two guidelines have been published, and provide councils with guidance on how to identify and report on contaminated sites in their area. A further three guidelines are proposed these will cover investigation, the rapid risk screening system and information management protocols.

Once all five guidelines have been published, we will review our contaminated sites strategy with the territorial authorities to provide a co-ordinated approach to contaminated site issues in our region. At present, the contaminated site information is passed on to territorial authorities, as they control land use, but how they use that information varies. The information on a site should be placed on a LIM or PIM making any potential purchasers/developers aware a site is potentially contaminated, however, there is evidence to show this may not be occurring.

9. Communications

The results of the study have been made available to the public via the annual state of the environment report card for soil (reported to the last Committee meeting).

10. Recommendations

It is recommended that the Committee:

1. *receive the report; and*
2. *note the contents.*

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Attachment 1: Common contaminant background concentrations ranges in soils for the Wellington Region

Attachment 2: Plan showing main soil types and sampling locations