

# Chapter 1

## Introduction

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### 1.1 Foreword

These Landfill Guidelines are a revision of the CAE *Landfill Engineering Guidelines*, originally published in “*Our Waste: Our Responsibility*” (1992).

Landfill siting, design, operations and monitoring have undergone major advances over the last thirty years. Awareness of the issues related to managing various categories of waste, together with growing concerns over the environmental effects of waste disposal, have seen significant improvement in the siting, design, operation and monitoring of waste disposal facilities in countries where waste disposal practices are not dictated entirely by cost.

However, current practice remains variable throughout New Zealand.

These revised guidelines have been written to:

- reinforce key components of the 1992 *Landfill Engineering Guidelines*;
- outline key issues and requirements with respect to the applicable legislation;
- provide additional guidance on siting, design and construction, with respect to new landfills and lateral expansions of existing landfills; and
- provide additional guidance on operations and monitoring at all operating landfills.

### 1.2 Objectives and Aims

The objectives of these Landfill Guidelines are to:

- provide the basis for siting, design, development, operation and monitoring of landfills in New Zealand in an environmentally acceptable and sustainable manner;
- provide practical guidance to landfill owners, operators and regulatory authorities in meeting their requirement to avoid, remedy or mitigate the adverse effects of landfill disposal, in accordance with the Resource Management Act (1991);
- reflect current recommended waste industry practice (both private and local authority) for key as-

pects of siting, design, operation and monitoring of municipal solid waste landfills, both new and extensions of existing sites, in the light of:

- developments in the practice of landfill siting, design, operation and monitoring;
- experience in the use and implementation of the 1992 *Landfill Engineering Guidelines* by landfill operators and regulatory authorities; and
- experience in the implementation of the Resource Management Act (1991).

In achieving these objectives these guidelines aim to:

- outline the key considerations in the siting, design operation and monitoring of landfills on a site-specific basis; and
- provide a consistent approach to landfill design and management to reduce the actual and potential effects of landfills on the environment.

These guidelines deal specifically with municipal solid waste landfills intended to accept municipal solid waste, as defined in Section 1.3 below.

Within New Zealand there are no specific and legally-binding requirements for the siting, design, operation and monitoring of landfills.

The final decision on site-specific requirements is made by the appropriate regulatory authority, or the Environment Court, under the provisions of the Resource Management Act (1991), following a site-specific assessment of effects on the environment.

Siting, designing and operating landfills, after consideration of the issues and, in accordance with recommendations contained in these guidelines, is expected to provide a reasonable assurance that the landfill site will not have significant adverse effects on the environment.

In developing and evaluating landfill proposals, landfill owners, operators and regulatory authorities need to consider in detail the resulting actual and potential effects on the environment taking into account the following:

- landfill size;

- landfill location and site characteristics;
- surrounding environment; and
- local community.

Specifics of siting, design, operations and monitoring will be determined following detailed technical, and non-technical, investigation and analysis.

Therefore, these guidelines do not eliminate the necessity for the development of site-specific requirements for investigations, design, operations and monitoring.

Figure 1.1 indicates the general issues associated with landfills and protection of the surrounding environment.

These guidelines are not intended to be a detailed technical manual, but rather a basis for landfill operators and regulatory authorities to seek detailed technical, planning and legal advice from appropriately qualified and experienced individuals and companies.

### 1.3 Waste Classification and Landfill Types

In this document waste classification and landfill types are defined as follows.

### Waste Classification

Waste is classified into four general categories:

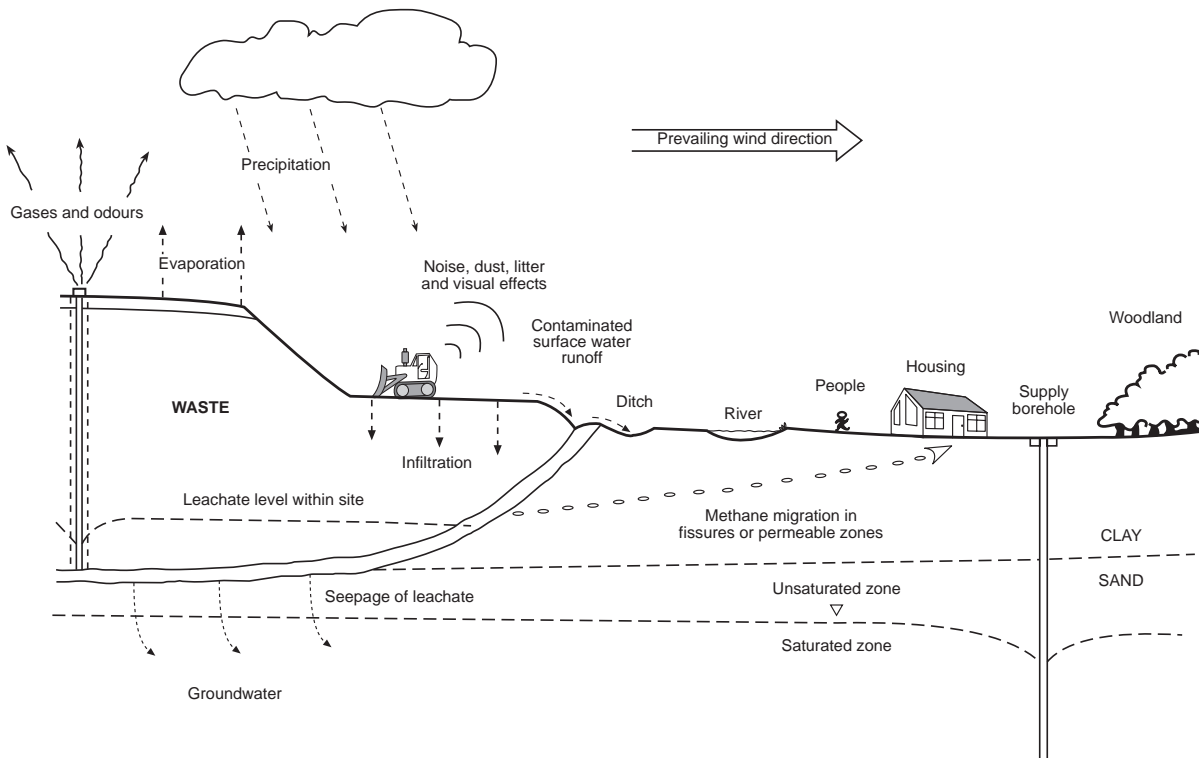
- cleanfill material (or inert waste);
- municipal solid waste;
- industrial waste; and
- hazardous waste.

### Cleanfill Material (or Inert Waste)

Cleanfill material, or inert waste, is waste that does not undergo environmentally-significant physical, chemical, or biological transformations, and has no potentially hazardous content once landfilled. It must not be contaminated or mixed with any other material.

Cleanfill material is defined as:

- Material that when discharged to the environment will not pose a risk to people or the environment, and includes natural materials, such as clay, soil and rock, and other materials, such as concrete, brick or demolition products, that are free of:
  - combustibles, putrescible, degradable or leachable components;
  - hazardous substances or materials (such as



**Figure 1.1: Environmental protection — Illustrations of source/receptor/pathway**  
 (Modified Figure 3.4 from UK Department of the Environment Waste Management Paper No. 26 B (1995))

municipal solid waste) likely to create leachate by means of biological breakdown;

- any products or materials derived from hazardous waste treatment, stabilisation or disposal practices;
- materials such as medical and veterinary waste, asbestos, or radioactive substances that may present a risk to human health if excavated; and
- contaminated soil and other contaminated materials.

### **Municipal Solid Waste**

Municipal solid waste is any non-hazardous, solid waste from a combination of domestic, commercial and industrial sources. It includes putrescible waste, garden waste, uncontaminated biosolids and clinical and related waste (including contaminated waste sterilised to a standard acceptable to the Department of Health). All municipal solid waste should have an angle of repose of greater than five degrees (5°) and have no free liquids.

It is recognised that municipal solid waste is likely to contain a small proportion of hazardous waste from households and small commercial premises that standard waste screening procedures will not detect. However this quantity should not generally exceed 200 ml/tonne or 200 g/tonne.

### **Industrial Waste**

Industrial waste is that waste specific to a particular industry or industrial process. It may contain somewhat higher levels of contaminants, such as heavy metals and human-made chemicals, than municipal solid waste and needs to be managed with environmental controls appropriate to the specific waste(s) being landfilled.

### **Hazardous Waste**

Hazardous waste is waste that poses a present or future threat to people or the environment as a result of one or more of the following characteristics:

- explosiveness;
- flammability;
- capacity to oxidise;
- corrosiveness;
- toxicity; and/or
- eco-toxicity.

Hazardous waste contains contaminants such as heavy metals and human-made chemicals, at levels high enough to require treatment to render them safe before landfill disposal.

For further discussion on hazardous waste refer to the CAE document *Management of Hazardous Waste* (2000). For recommendations on landfill waste acceptance criteria with respect to hazardous waste, refer to Section 5.6 of these guidelines.

### **Landfill Types**

Landfills are classified into four categories:

- cleanfill;
- municipal solid waste landfill;
- industrial waste landfill; and
- hazardous waste landfill or hazardous waste containment facility.

#### **Cleanfill**

A cleanfill, or inert waste landfill, is any landfill that accepts only cleanfill material and inert wastes, including clean excavated natural materials. In general the only effective environmental controls on discharges to land and water from cleanfills relate to waste acceptance criteria.

#### **Municipal Solid Waste Landfill (MSWL)**

A municipal solid waste landfill (MSWL), also often referred to as a sanitary landfill, is any landfill that accepts municipal solid waste. A municipal solid waste landfill may also receive inert waste.

#### **Industrial Waste Landfill (IWL)**

An industrial waste landfill (IWL) is a landfill that is designed to accept predominantly industrial waste. In many cases industrial waste landfills are monofills, associated with a specific industry or industrial location (for example mining, forestry and smelting) and designed and operated in accordance with the specific wastes targeted. Design, operation and monitoring requirements may be more, or less, stringent than for municipal solid waste landfills. An industrial waste landfill may also receive municipal solid waste and inert waste, depending on design.

#### **Hazardous Waste Landfill (HWL)**

A hazardous waste landfill (HWL), or hazardous waste containment facility (HWCF) is any landfill that accepts waste formally defined as “hazardous waste” in statutory instruments, or as specifically determined

through any special requirements that may be set by the Environmental Risk Management Authority (ERMA).

Siting, design, operations and monitoring requirements for landfills accepting hazardous waste will be considerably more stringent than for landfills accepting only municipal solid wastes.

For further discussion on hazardous waste landfills refer to the CAE document *Management of Hazardous Waste* (2000).

## **1.4 Layout of the Guidelines**

These Guidelines are set out in the following sections:

- landfills and legislation;
- siting;
- design;
- operations; and
- monitoring.