

## KNOCKHARLEY LANDFILL RECOVERY REPORT (Condition 11.3)

### 1. Sources of Daily and Intermediate Cover and Road Construction Materials for Recovery

The following materials are recovered as daily and intermediate cover and road construction materials at Knockharley landfill.

1. Construction & Demolition Fines (C&D Fines)
2. Commercial & Industrial Fines (C&I Fines)
3. Compost Like Organics (CLO)
4. Woodchip (WC)
5. Incinerator Bottom Ash (IBA)
6. Soil and Stone
7. Rubble

The table below outlines the cover material types in more detail

Cover Material	EWC Code	Origin
C&D Fines	19 12 12	Tromelling of C&D Waste Skips
C&I Fines	19 12 12	Processing of oversize material from C&D Skips
CLO	19 05 99	Bio-stabilisation of Organic Fines from the removal of organic waste from MSW
WC	19 12 12	Shredded woodchip from C&D skips
IBA	19 01 12	Non-hazardous bottom ash from Indaver incinerator
Soils	17 05 04	Non-hazardous soils from construction sites
Rubble	19 12 12	Crushed concrete from C&D skips

### 2. Cover material stockpile management

Cover material is delivered to site daily by various waste collectors/processors. The quantity of cover delivered in any one day roughly matches the quantity of cover material needed to cover the working face per day. Any surplus is stored in an adjacent stockpile area to be used the next day or to be used for intermediate cover at later date.

At times when there is increased waste intake e.g. during incinerator or cement kiln shut down, additional cover may be required, and arrangements are made with cover suppliers to provide additional daily deliveries or to stockpile additional quantities on site.

### 3. Cover material characteristics and quality assessment

Sampling and testing of the cover material is required by the licence.

C&D Fines, C&I Fines and CLO are tested by the waste supplier at a rate of one sample per 500 tonnes. C&D Fines, C&I Fines are tested for AT4 and Gypsum and CLO is tested for AT4 only. This is to ensure that these materials are in compliance with the conditions of the licence and

the requirements of the Landfill Levy Regulations i.e. AT4 <7 mg O<sub>2</sub>/g dry matter and <5% Gypsum by weight.

Soil and stone acceptance are only done following the waste producer providing a detailed assessment of the material including demonstrating that the soils and stone is non-hazardous.

Non-hazardous Incinerator Bottom Ash is accepted from Indaver.

A visual assessment of all other material i.e. Woodchip and Rubble is carried out to ensure it is fit for purpose i.e. size, contamination rates, dusty etc.

#### **4. Working face cover application**

The working face of the landfill is managed in accordance with Condition 5.6 of the licence i.e. maximum size is 25m x 25m, 2.5m deep after compaction and slopes of no greater than 1:3.

In practice it is very difficult to keep the working face smaller than 25m x 25m. This is because the waste is generally delivered in walking floor trailers which contain approximately 90m<sup>3</sup> of waste (25 tonnes approx.). When these trailers are emptied, for the compactor to level out the waste and compact it properly, the waste is spread out over an area of at least 10m x 10m. When a few of these trailer loads are received each day the working face naturally requires the maximum size of 25m x 25m. The working face is continuously developing as each day progresses.

Maintaining vehicular access, and a safe working environment for staff, mean that a solid relatively level surface is required. In order to achieve this a thin layer of CLO/Fines is applied as the working face develops each day; this allows vehicles to reverse to the active tipping area, it also temporarily covers the active face during the day and helps prevent waste odours from arising during operations.

At the end of each working day, once all municipal or other type waste e.g. bulky, street cleaning, sewage sludge etc. have been spread out and compacted the waste is covered with daily cover to prevent any nuisances occurring i.e. odours, litter etc. This is in compliance with Condition 5.7.2 of the licence.

Daily cover is applied using a 20t excavator. It involves sprinkling daily cover material over the entire area of the working face. In practice it is very difficult to apply exactly 150mm of cover as prescribed by the licence (condition 5.7). Daily cover depths would range from 150mm to approx. 300mm, with 250mm being the average applied.

#### **5. Intermediate over application**

Knockharley landfill is a relatively shallow landfill site with a large surface area. The site operates a system of filling two cells at a time. Each cell covers an area of 125m x 65m. The area of the two cells combined is 250m x 65m. Once a cell is filled by a Lift (2.5m of waste) filling moves to the next lift. This occurs on average 4 times per year in each cell. Therefore, the entire area of both cells requires Intermediate cover four times per year.

Once an area has been filled with waste, and it is not planned to place waste in that area again for a period, an intermediate cover of 500mm of cover material is applied to prevent nuisance occurring. The intermediate cover generally comprises C&D Fines or Soil & Stone. The intermediate cover is tracked in to prevent odours escaping and to provide a safe level working surface for vehicles and employees.

## 6. Haul roads, turning circle and stockpile area construction

In order to provide quick and safe access for trucks delivering waste to the landfill it is necessary to construct roads, turning circles and stockpile areas. These are constructed using clean crushed rubble (<150mm). They also need to be maintained and repositioned as filling the cells progresses. The stockpile areas need to be level and solid to allow tipper trailers safely tip their loads, any unevenness could lead to overturned trucks/trailers.

## 7. Quantities of materials required

Figure 1 shows the typical layout of Knockharley landfill and shows the areas and dimensions of where daily cover, intermediate cover, haul roads and stockpile areas are used.

### 7.1 Daily cover

The licence requires 150mm of daily cover to be applied to the working face. In practice it is very difficult to get exactly 150mm of cover applied evenly. Experience has shown that to prevent odours and bird scavenging between 200mm to 300mm of daily cover is required. An average of 250mm daily cover is assumed.

$$25\text{m} \times 25\text{m} \times 0.25\text{m} = 156.25\text{m}^3 \text{ of cover per day}$$

$$156.25\text{m}^3 \times 250 \text{ operational days} = 39,062.5\text{m}^3$$

Density of the materials used as cover is on average 1.4.

$$39,062.5\text{m}^3 \times 1.4 \text{ t/m}^3 = 54,687.5 \text{ tonnes per annum}$$

### 7.2 Intermediate cover/temporary capping material quantities required

Experience shows that in order to control odours and landfill gas emissions, as has been successfully demonstrated by the falling number of odour complaints, 0.5m of Intermediate cover/Temporary capping is required.

$$250\text{m} \times 65\text{m} \times 0.5\text{m} \times 4 \text{ (Lifts)} = 32,500\text{m}^3/\text{annum}$$

$$32,500\text{m}^3 \times 1.4 \text{ t/m}^3 = 45,500 \text{ tonnes per annum}$$

### 7.3 Haul road construction

Internal haul roads require either stone or other clean hard material to allow quick safe access for delivery trucks to reach the working face. Historically this has been done by using crushed rubble. The site is 250m wide and typically the roads are constructed 8m wide to allow two truck to pass. Roads are constructed 0.5m deep and are compacted in using a roller. Roads are sometimes surfaced using IBA. Typically, roads would be built and repositioned at least three times per year to allow each lift of waste to be placed.

$$250\text{m} \times 8\text{m} \times 0.5\text{m} \times 3 \text{ times/year} = 3,000\text{m}^3$$

$$\text{Density } 2 \text{ t/m}^3 \times = 6,000 \text{ tonnes per annum}$$

### 7.4 Turning circle and stockpile area

Trucks delivering the waste to site are generally articulated trucks up to 16m in length and 42 tonnes gross weight, typically 25 tonnes per load. In order to facilitate these types of vehicle turning and to provide a level/safe tipping area a turning area/stockpile area of approx. 30m x 30m is required. This area needs to be solid to allow safe tipping of loads.

$$30\text{m} \times 30\text{m} \times 0.5\text{m} = 450\text{m}^3$$

$$\text{Density } 2 \text{ t/m}^3 = 900 \text{ tonnes}$$

$$900 \text{ tonnes} \times 4 \text{ times/year} = 3,600 \text{ tonnes per annum}$$

## 8. Summary of quantities of cover material for recovery

The total quantity of cover and road building materials required per annum is, approx. 110,000 tonnes per annum, as detailed in sections 7.1 to 7.4 above. These are required for recovery to support Knockharley landfill to operate in compliance with its licence conditions. The 110,000 tonnes are on top of the maximum quantity of 88,000 tonnes which can be accepted for disposal on-site.

The 110,000 tonnes per annum is an approximate figure and depending on the type of waste accepted for disposal slightly more or less recovery material may be required e.g. wet, bulky or odorous waste may require more cover material. A figure of +/- 10% could be applied to the recovery figure if the overall licence limit of 200,000 tonnes per annum is not exceeded i.e. 99,000 to 121,000 tonnes per annum.

### Knockharley Landfill - Typical Layout

