

# Solid Waste Management Case Study

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Project

## Remediation of Burning Dumpsite Mansoura, Governorate of Dakahleya

### Introduction

The main municipal dumpsite for Mansoura City, adjoining Talkha and the surrounding environs was located on the outskirts of the city, adjacent to the sewage treatment works. Approximately 100-150 loads or 400 tons of waste were delivered daily to the site. There were no tipping controls and waste was dumped randomly and set on fire.

Nearby residents had complained of smoke, odour and litter nuisance and people were reluctant to occupy apartment blocks recently built in the area. Responding to a request from the Governorate, the SEAM Project implemented a programme of remediation. Introducing better tipping practices, extinguishing smouldering fires and stabilising large mounds of burnt waste were key implementation priorities. In addition training was provided to the dumpsite workers and the role of scavengers was addressed.

Remediation was undertaken from July to September 1995 and tipping continued on other designated parts of the site till it was eventually closed in November 1996. There are plans by the Governorate to convert the remediated area to a public park.

Remediation cost LE105,120. A bulldozer and water pump were hired for the remediation and subsequently the Governorate purchased a bulldozer to maintain the new tipping practices.



*Dousing Smouldering Hot-Spots in Areas of Burnt Waste*

### Diverting Incoming Waste

The first stage of the programme was to divert incoming waste to a new tipping area on the same site. This would avoid incoming refuse being ignited by the existing mounds of smouldering waste. An area of disused sludge drying beds, immediately adjacent to the burnt waste was selected.

Groundwater impacts were assessed and considered insignificant in the light of past practices. It was reported that the old dumpsite had not adversely affected the quality of the groundwater. In view of this and the remaining limited life of the site the use of a waste liner at this late stage was considered not feasible.

### Introducing New Tipping Practices

Incoming waste was dumped and spread out by a shovel loader to allow scavengers access to recover any recyclable materials. By controlling the area where scavengers could work this reduced the safety risk as previously they roamed the site often getting in the way of incoming vehicles.

The bulldozer was then used to tip, level and compact the waste in layers, or cells, between 10-20m wide and to a height of 2m. The waste cells were covered at the end of each day with a thin layer (150mm) of soil excavated at the site or by using suitable incoming construction waste. Daily cover minimises the risk of spontaneous combustion and reduces odour, flies and the amount of wind blown litter.

Cells were planned over the available areas and were prepared several days ahead by recovering and storing available cover material. Banks, 2m high, were also prepared around the proposed cell. Tipping in successive layers on the top of existing cells was practised up to a maximum height of 10m.

Training for the supervisors and onsite workers was provided on the new tipping procedures.



*Preparing New Waste Cells and Removing Cover Materials*

### How were Dumpsite Fires Extinguished?

Waste that had been recently dumped and set on fire would burn out within a few days. Diverting incoming waste to a different part of the site prevented adding further fuel to the existing fires.

However there was a huge volume of burnt waste that continued to smoulder in places. These areas were doused in water by pumping treated effluent from the discharge canals of the adjoining sewage treatment works. Despite this there were still hot spots which continued to smoulder at depth. These were excavated with a back-end loader and doused.

### Did Waste Disposal Continue?

In the period July to September 1995 an area of about 100m by 100m had been tipped to an average depth of approximately 3m, representing a total input of 30,000m<sup>3</sup>. The average volume tipped weekly was therefore around 2,500m<sup>3</sup> after compaction on site. The total remaining area for tipping as at September 1995 was identified at 137,500m<sup>3</sup> as indicated below.

#### Available Disposal Space, Mansoura Dumpsite (September 1995)

Location on Site	Area (m <sup>2</sup> )	Available Depth (m)	Volume (m <sup>3</sup> )
Disused sewage sludge drying beds	10,000	3	30,000
Low areas caused by burned out waste	10,000	2	20,000
Borrow pits from excavated cover material	10,000	3.5	35,000
Other disused areas of the sewage works	10,000	3.5	35,000
Site of disused waste incinerators	5,000	3.5	17,500
<b>TOTAL</b>	<b>45,000</b>		<b>137,700</b>

At the rate of delivery of waste to the site, the tipping space identified as available gave a life span of 55 weeks. The dumpsite was subsequently closed in November 1996.

### Converting the Dumpsite to a Public Park

The burnt out waste remained in unstable mounds up to 12m in height. These areas were then graded to form a gentle slope and covered with soil excavated at the site. The covering served to:

- ❖ Reduce the likelihood of wind blown ash.
- ❖ Reduce the oxygen supply to underlying areas thereby minimising the risk of further combustion.
- ❖ Improve the visual impacts.

With grading and top dressing the area had been beneficially upgraded and was left in a suitable condition to be transformed into a public garden as planned by the Governorate.



*Before and After Remediation : Residents Previously Suffered Smoke ,Odour and Litter Nuisance*

### How were the Scavengers Affected?

An average of 64 scavengers worked on the old dumpsite, their ages ranging from 7 to 60. Before remediation the scavengers lacked even the most basic facilities. They had no access to clean water for drinking or washing, nowhere to eat or rest, no shelter and no proper toilet facilities. They and their children washed in the sewage works effluent and were exposed to considerable hazards from dangerous materials on the dumpsite (particularly clinical waste).

The scavengers arrive at the tip around 8.00 a.m. in the morning and remain while there is still sufficient daylight to sort waste. This is around 8.00 p.m. in summer and 6.00 p.m. in winter. The average quantities of recyclable materials that scavengers can pick per day is estimated as: 2 tons of paper; 100kg of glass; 50-100kg of plastics; and 150-700kg of metals. The average productivity of the scavengers per day is about 40-45kg of assorted dry materials. Earnings can amount to LE7-12 per person per day equivalent to LE175-300 per month.

A social development study was commissioned to assess how to best deal with the scavengers. A number of options were considered including banning them completely although this would have detrimental consequences in loss of income to the individual. The favoured option allowed scavenging to continue but under controlled and improved conditions, which included:

- ❖ Designated area for scavenging incoming waste with time allowed to pick the waste before it was moved to the tip and compacted. This reduced the dangers of scavengers being accidentally hit by incoming vehicles.
- ❖ Preventing waste burning, which reduced their exposure to smoke inhalation.
- ❖ Provision of protecting clothing.
- ❖ Educating scavengers on health and safety issues.
- ❖ Provision of a shaded rest area.
- ❖ Provision of a first aid kit.

Due to the limited life of the dumpsite a clean water supply for drinking and washing could not be provided but was recommended for any new dumpsite.



*Tipping Operations at Mansoura Dumpsite*

### What are the Benefits of Remediation?

The introduction of the new tipping practices and the remedial works undertaken resulted in the following benefits:

- ❖ Elimination of fire and smoke and the minimisation of odour nuisance to nearby residents and people working at the site.
- ❖ Reduced problems associated with wind-blown litter and flies.
- ❖ Greater operational safety.
- ❖ Better control on scavenging and improved working conditions for scavengers.
- ❖ More income for scavengers due to easier access for recovering recyclables.
- ❖ Improved visual appearance of the site by cleaning, levelling and covering the old dump areas.
- ❖ Proposed Governorate redevelopment of the remediated site to a public park.
- ❖ Capacity building of supervisors and workers to maintain and replicate the new tipping practices.

Nearby residents were very pleased with the results of the remedial actions. It was also noted that residential building activity in the nearby areas had also accelerated since the site had been remediated.

### What are the Costs for Better Tipping Practices?

Equipment costs for implementation are outlined below.

#### Implementation Expenditure for Remedial Works and Improved Tipping

Item	Cost (LE)
D6 Bulldozer hire for 3 months	58,700
Extraction and transportation of daily cover material	31,600
Water pump rental and hose pipe	3,820
On site workers	4,600
Equipment for scavengers	2,800
Miscellaneous (spare parts, fuel etc.)	3,600
<b>TOTAL</b>	<b>105,120</b>

An approximation of the increased weekly operating costs as a result of the improved tipping practices are outlined below.

#### Approximate Weekly Increases in Operating Costs

Item	BEFORE LE	AFTER LE
Staff	320	320
Bulldozer (based on LE100 per hour rental)	500	4,000
Water pump (based on LE30 per day rental)	NA	180
2 x Tractor-trailers (based on LE 80 per day rental)	NA	960
<b>TOTAL</b>	<b>820</b>	<b>5,460</b>
Cost LE/m <sup>3</sup> (based on 2,500m <sup>3</sup> per week)	0.33	2.18
Costs spread per household per month	0.05	0.30

## CONTACTS

More information on this project and the SEAM Project, are available from:

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## The SEAM Project

Support for Environmental Assessment and Management (SEAM) is a multi-disciplinary environmental project being funded by Britains Department for International Development. This project is being implemented by the Egyptian Environmental Affairs Agency (EEAA) through the Technical Cooperation Office for the Environment (TCOE) and Entec UK Ltd., a UK engineering and environmental consultancy.

## Solid Waste Management

Improving solid waste management had been identified as a high priority in the Governorates of Dakahleya and Sohag. The SEAM project developed a strategic approach to tackle the problem and funded projects that showed tangible benefits of improved waste practices.

## Solid Waste Strategies

To address the issue of solid waste management, an assessment of the current waste practices has been undertaken in the Governorates of Dakahleya and Sohag. Information was collected on the type and quantity of waste generated, the present collection, separation, treatment and disposal practices as well as the institutional and social dynamics.

A strategic approach to deal with the solid waste problems was developed and priority issues identified.

## Solid Waste Demonstration Projects

Solid waste demonstration projects were undertaken in both Governorates to address priority issues that had been identified in the waste strategies. Four demonstration projects were implemented covering areas of waste collection, transfer and disposal, maintenance, dumpsite remediation, recycling and composting. In all cases solutions were sought that:

- Are practical and affordable.
- Improved the efficiency of previous practices.
- Adapted the most cost effective technology to suit the purpose.
- Strengthened local capacity.
- Developed local manufacturing capability.
- Addressed sustainability issues.
- Involved the community.

As a result of the demonstration projects:

- 23,000 tons of municipal waste are collected each year.
- 45,000 tons of waste each year are recycled and converted to compost rather than being disposed to dumpsites.
- 115,000 people living in four low income urban and rural communities in Sohag and Dakahleya Governorate now benefit from improved waste collection and disposal services.
- Fires extinguished, odour and litter minimised at 2 municipal solid waste dumpsites.