



DEVELOPMENT
COMPANY



**Leachate head levels development assessment
Trehir Landfill Site**

January 2006

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Introduction

This study has been undertaken to assess the leachate level on the front face of the waste mass. Management and monitoring of the leachate level is based on two main objectives. On the one hand, control the waste mass stability and on the other hand, prevent leachate egress of the waste mass.

This study takes into account the results since 2003.

First, the conclusion of the last stability study undertaken in 2003 will be reminded.

Then, leachate head level monitoring data will be compared with the two main objectives we have to success.

In conclusion, adapted management and leachate monitoring procedures to adopt during the aftercare period will be present.

1. Waste mass stability study (January 2003, Golder associates)

The waste mass stability takes into account a study dated January 2003. This assessment has used the revised profile.

This study is shown on **appendix 1**.

1.1. *Stability analyses*

1.1.1. Principles

Three cross sections have been used to assess the stability of the site. These cross sections are considered to be representative of the conditions at the site.

Four main materials have been modelled in the stability analyses: capping soils, waste, subgrade and geosynthetic interfaces.

In the stability analyses, the maximum recorded leachate levels at the three cross-sections have been used to assess the stability of the final waste profile.

1.1.2. Results

- Section A-A

A factor of safety less than 1.3 is obtained for leachate levels greater than 6m and 10m at M1/2 and M1/4 respectively. However if the leachate level at the toe of the slope (M1/2) is maintained at 4m, then the level at M1/4 can rise to around 13m before the factor of safety reduces below 1.3.

- Section B-B

A factor of safety less than 1.3 is obtained for leachate levels greater than 7m and 14m at M2/2 and M2/5 respectively. However if the leachate level at the toe of the slope (M2/2) is maintained at 3m, then the level at M2/5 can rise to around 20m before the factor of safety reduces below 1.3.

- Section C-C

The measured leachate levels in the vicinity of section C-C are relatively low compared to the other two cross-sections and this is seen in the higher calculated factors of safety. The factor of safety decreases with increasing leachate levels to 1.34 for 14m and 18m of leachate at M2/1 and M2/4 respectively.

1.1.3. Conclusion

The stability analyses have demonstrated that the leachate levels within the site are critical to the stability of the site. Nevertheless, the factor of safety is in excess of 1.3 and therefore generally considered satisfactory. Moreover, the stability of the site will increase in the long term as the waste settles to its post-settlement profile.

2. Leachate head levels monitoring since 2003

It should be noted that the leachate level has not required the use of the front face pumps since 2003. Monitoring of the leachate head levels is continuous.

2.1. Results

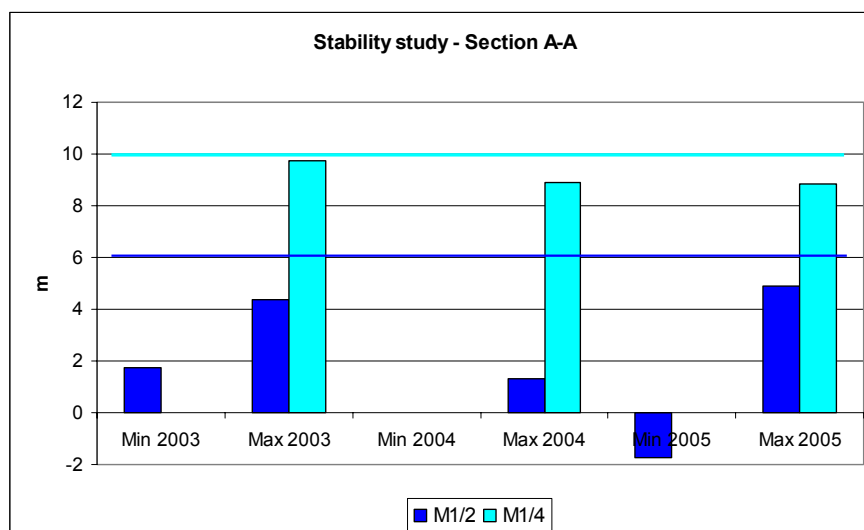
The table below summarises the minimum and maximum leachate head levels monitored on site since 2003.

	Min 2003	Max 2003	Min 2004	Max 2004	Min 2005	Max 2005	Trigger level according stability study dated 2003	Waste Management Licence trigger Level
M1/2	1,76	4,38	0	1,32	-1,76	4,92	6	12,5
M1/4	0	9,76	0	8,88	-0,01	8,84	10	12,5
M2/2	3,48	5,46	0	4,46	0	2,02	7	12,5
M2/5	0	10,4	8,58	10,9	4,2	10,05	14	12,5
M2/1	0,46	2,35	0	6,5	-1,85	-0,92	14	12,5
M2/4	5,1	8,82	0	12,5	6,38	7,02	18	12,5

Table 1: Leachate head levels since 2003

2.2. Comparison with the stability study results

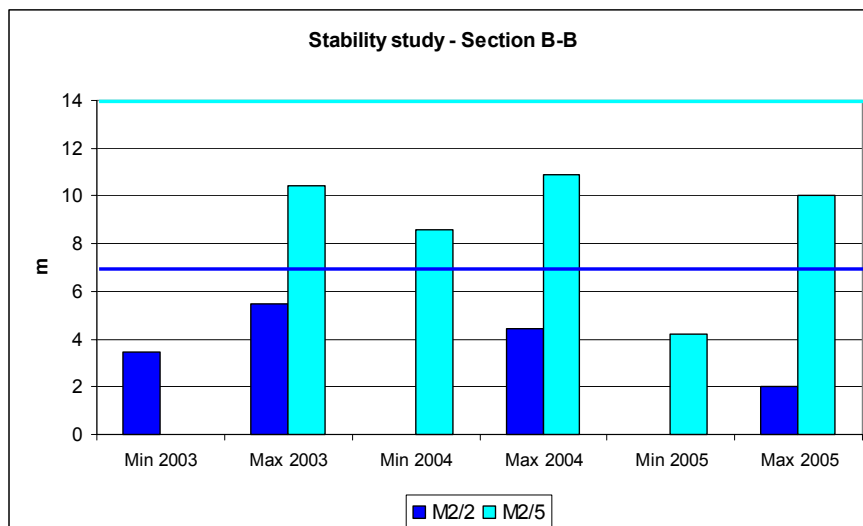
i) Section A-A



Drawing 1: Stability results - Section AA

It should be noted that since 2003 leachate head levels in section A-A have never exceeded the trigger level underlined by the latest stability study namely 6m and 10m at M1/2 and M1/4 respectively for a factor of safety bigger than 1,3.

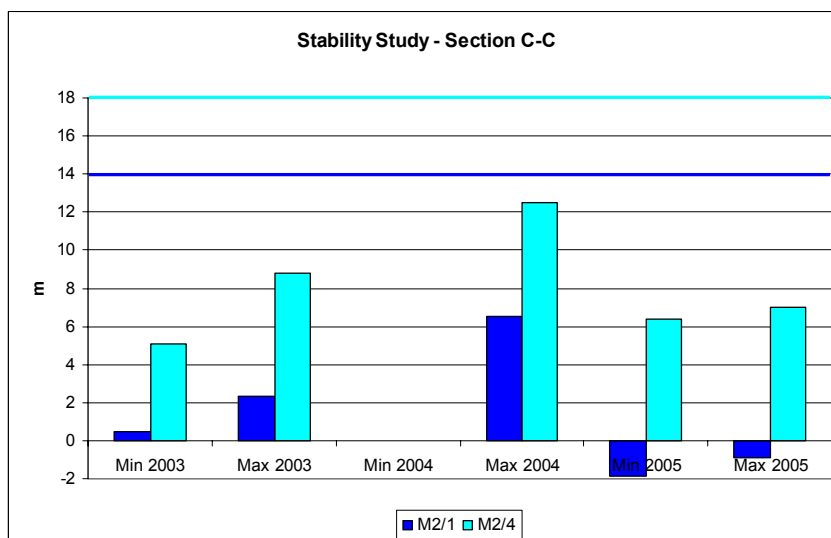
ii) Section B-B



Drawing 2: Stability results - Section BB

It should be noted that since 2003 leachate head levels in section B-B have never exceeded the trigger level underlined by the latest stability study namely 7m and 14m at M2/2 and M2/5 respectively for a factor of safety bigger than 1,3.

iii) Section C-C



Drawing 3: Stability results - Section CC

It should be noted that since 2003 leachate head levels in section C-C have never exceeded the trigger level underlined by the latest stability study namely 14m and 18m at M2/1 and M2/4 respectively for a factor of safety bigger than 1,34.

2.3. Comparison with the Waste Management Licence trigger level

Leachate levels are monitored at leachate wells in the front face of the landfill to ensure leachate head levels are maintained at a level below 12,5m AOD to prevent leachate outbreak.

The trigger level identified in the waste licence is 12,5m below ground level however the Environment Agency has clarified that this should read 12,5m over the quarry base i.e. leachate head.

All the recorded leachate head levels since 2003 are shown on **appendix 2**.

2.4. Conclusion

2.4.1. Evidence that the waste mass is stable in short and long term

It can be seen that the waste mass has remained stable since 2003, this being obtained with a safety factor higher than 1.3.

Moreover, capping the landfill will reduce the infiltration of rainwater into the waste and consequently reduce the volume of leachate generated, thus the possible maximum height of leachate head.

Once the waste mass has settled, the stability over the long term should be higher still.

2.4.2. Leachate head levels are maintained below the Waste Management Licence trigger level

The leachate head levels monitoring results put in evidence that the leachate head level as defined in the licence hasn't been reached since 2003 without use pumps. So, the leachate outbreak risk is control.

3. Leachate head level management and monitoring during after care period

The two main objectives have been reached since 2003 and the leachate level has not required the use of the front face pumps.

We can conclude to no risk neither stability risk nor leachate outbreak risk.

We suggest then the leachate level management and monitoring during aftercare period described below:

The Trehir Landfill Site has 10 monitoring points for leachate levels within the waste mass. Levels are recorded from ground level measuring the distance to the leachate below ground level on a monthly basis by Severn Trend Laboratories. A Geotechnical dip meter is used.

These monitoring points are sufficient to allow samples and for monitoring purposes. They will be maintained in a serviceable condition for the post closure life of the landfill. The six pumps which have been put in place to maintain leachate head levels below WML trigger level can be remove.

These monitoring points or suitable alternatives will be maintained in a serviceable condition for the post closure life of the landfill.

Where monitoring points are repaired or replaced the revised levels will be surveyed and the table of cross-referenced revisions will be copied to the Environment Agency.

Appendices:

Appendix 1: Stability study, Golder Associates January 2003

Appendix 2: Leachate level monitoring results