

ANNEX 3

Ta' Zwejra Closure Plan- Summary

Filling at the Ta' Zwejra landfill finished a number of years ago and the waste mound has undergone a degree of stabilisation. The site is essentially closed and now requires some engineering works to ensure effective environmental controls are in place prior to the final rehabilitation of the site some time in the future.

The closure of the site consists of three elements of work, which would be carried out sequentially:

- i) re-profiling works
- ii) installation of an intermediate cap and
- iii) installation of a gas management system.

Re-profiling Works

It is proposed that the waste is re-profiled in order to form slopes no steeper than (typically) about 1v:2.5h with benches 4m wide approximately 6m apart vertically. This will ensure overall stability of the waste, ensure effective surface water drainage, facilitate the installation of the Intermediate Cap and the Gas Collection System and allow essential future site maintenance. A 6m wide 'machinery' access road has also been included along the lower western flank of the site.

The construction of two low retaining bunds on the southern and eastern flanks of the site is also proposed. This will assist the process of repositioning waste within the available void space.

The re-profiling has been devised to minimise the amount of waste material that has to be relocated. The works will be carried out using conventional earthmoving plant.

The extent of the works are shown on Drawings D117657/TZ/03A and 04.

Intermediate Capping System

This comprises the placement of a Regulating Layer, installation of a Geosynthetic Clay Liner (GCL) and, subsequently, the placement of Restoration Soils. The Capping System would be placed over the entirety of the waste mass and tie into the basal (sidewall) lining system effectively isolating the wastes and their degradation products from the wider environment.

Regulating Layer: A minimum 250mm thick layer is required, to protect the GCL from waste objects that may cause puncturing. This would consist of crushed limestone (surface particles no greater than 20mm) and would be adequately compacted to provide sufficient bearing capacity for the GCL and any plant during cap deployment.

Geosynthetic Clay Liner: A 6mm low permeability GCL is proposed to be placed over the regulating layer. This will reduce precipitation infiltration (thus limiting the production of leachate) and reduce significantly the emission of landfill gas from the site to the atmosphere. The GCL cap will overlap the existing sidewall lining system, by at least 1m, thus forming a seal.

Restoration Soils: A minimum 350mm thick layer of restoration soils will be placed over the GCL, to ensure that the latter stays in place and remains hydrated. This depth of material has been shown to be effective in earlier trials at the site. The restoration soils

will comprise a mixture of crushed limestone and clay. No compaction is required. The surface will be planted with grass to ensure minimal surface erosion.

The proposed capping system is shown on Drawing D117657/TZ/CAP/01

Gas Management System

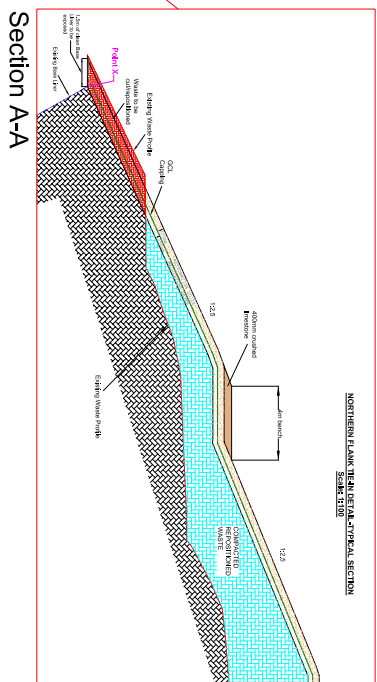
Following completion of the construction of the capping system, the gas management system will be installed. This will comprise approximately 25 (no) gas wells, installed across the site at, typically, 40m intervals. These will be integrally sealed with the low permeability cap and connected via pipes to 4 (no) manifolds which will be then connected to a gas main. It is proposed that gas wells, connecting pipework, manifolds and gas mains are constructed from black MDPE, apart from the hot areas where the use of steel will be considered. Temperature monitoring will take place to identify hot areas following the completion of the re-profiling works.

'Knock-Out-Pots' are proposed to be installed at the low spots of the gas main.

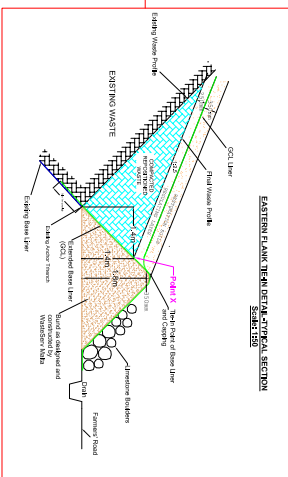
The final layout of the Gas Management System will be flexible to allow the Operator to isolate specific areas if this is required (ie it will be possible to extract gas from one part of the site only).

The gas will be directed towards the adjacent gas treatment facility constructed to treat the gases collected from the Magtab site. This size of the facility is such that it can readily accommodate these additional inputs. There are proposals to utilise the landfill gases for energy production in the future.

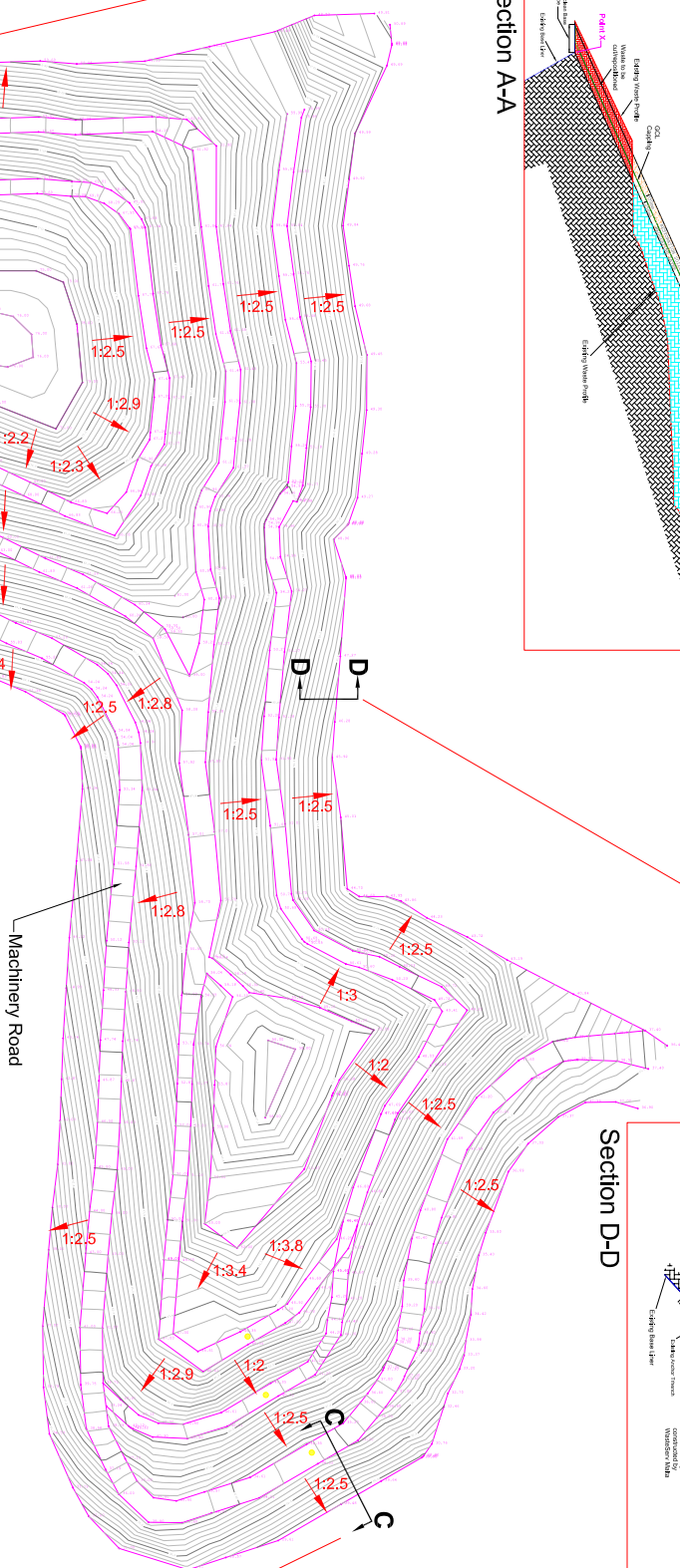
Details of the proposed gas management system is shown on Drawing D117657/TZ/GAS/01



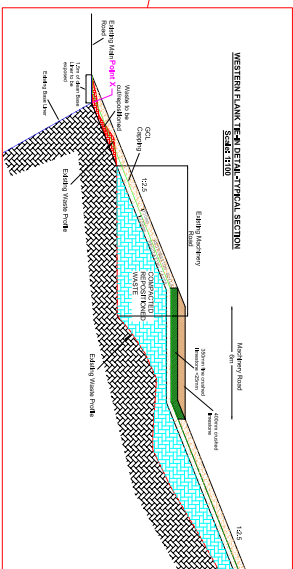
Section D-D



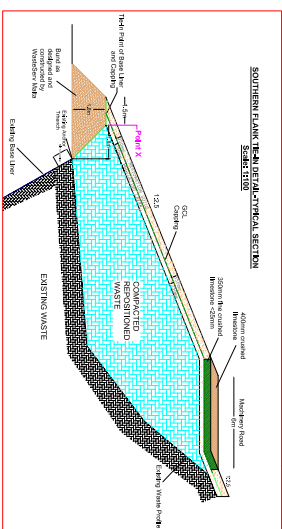
EASTERN FLANK TIE-IN DETAIL-TYPICAL SECTION
Scale: 1:50



✓ Machinery Road



WESTERN FLANK TIE-IN DETAIL-TYPICAL SECTION
Scale: 1:100



SOUTHERN FLANK TIE-IN DETAIL-TYPICAL SECTION
Scale: 1/16"

Section C-C

THIS CRAWLING MAY BE USED ONLY FOR THE PURPOSES INTENDED AND ONLY WRITTEN CONDITIONS SHALL BE USED.

1. The design of this profile is based on survey 146529W003.dwg (courtesy of R. Cramer and L. Hill and provided by R. Cramer@hawaii.edu).
2. Boundary of Target Profile plan corresponds to Point X on Section 06483.
3. Waste settlement will reduce the physical pre-slopes contours by approximately 20%.
4. The surface water flows towards the southern end of the landfill.
5. All benches are 6m apart vertically and 4m wide.
6. The machinery road (lowest bench at the western and southern flank) is 6m wide.
7. It is recommended that all benches are 140k with a 400mm layer of crushed limestone, should these be used as access roads.

Low Spo

Slope Gradient

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CONSULTANCY SERVICES FOR THE
TAZNEERA LANDFILL CLOSURE PLAN
INCLUDING INTERMEDIATE CAPPING AND
MANAGEMENT SYSTEM

TOP OF
PRE-SETTLED WASTE
TARGET PROFILE
AND
CONSTRUCTION DETAIL

Scale of 1:2500
1:2500' sections as shown on the drawing

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