# Copping C-cell design principles

## What is a C-cell?

Tasmania's *Landfill Sustainability Guide 2004* defines 3 categories of landfills: A (for solid inert waste, eg. building rubble), B (for general domestic waste) and C (for controlled waste). The C-cell is an individual landfill cell designed specifically to store controlled waste.

## What is controlled waste?

Controlled waste is waste that could be hazardous to human health or the environment if it is not managed carefully. If it is carefully managed it will not cause harm. Unlike all other states, Tasmania currently has no landfill cell specifically designed to properly manage controlled waste. Many controlled wastes are therefore temporarily stockpiled around the state on the sites where they were produced or they are sent interstate for others to deal with.

## Why Copping?

The C-cell will be constructed adjacent to the existing cells of the Copping landfill facility, which has been operating for a decade. The site was selected for the landfill facility because of its excellent combination of stable geology, readily manageable surface water and groundwater and its central location to service the needs of southeast Tasmania. These same attributes also make it well suited to the C-cell.

The C-cell will be an asset to Tasmania as our first and only cell dedicated to properly storing controlled waste. It will allow Tasmania to deal with its current controlled waste stockpiles and with future controlled waste generation, like all other states do.

Only solid and sludge controlled wastes will be accepted at the cell, no liquids. Only controlled waste types approved in writing by the EPA Director will be able to go to the cell. Approval will be considered by the Director on a case by case basis, using all available scientific information about the waste characteristics and risks, including national and international guidelines.

## What are the design standards the C-cell must meet?

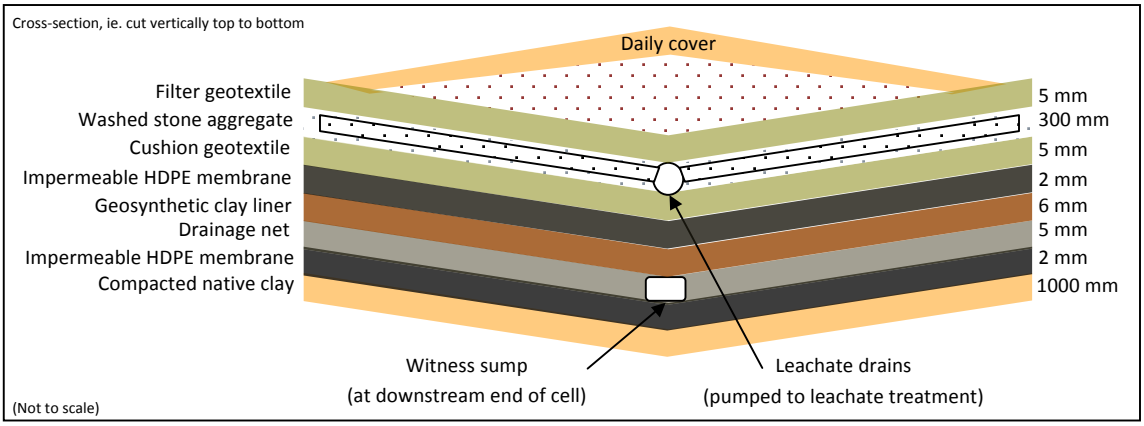
The design standards for landfills are specified by the Sustainability Guide, which implements international best practice design principles. The C-cell design exceeds the standards for controlled waste (the highest design standard).

## How will wastes be placed in the cell?

Approved controlled wastes will be placed in the cell individually. There will be no mixing of wastes. If the waste is loose, such as contaminated soil, it will be tipped and compacted. If stockpile waste arrives in storage bins, it will be left in the bins unless there is a good environmental reason not to[1] and they will be stacked inside the cell. If the waste is contaminated timber it will be stacked inside the cell. The positions and types of all wastes will be recorded. At the end of each day any exposed waste will be covered with clean soil or roll-up geotextile fabric.

## How will leachate be stopped from entering the environment?

The C-cell will have a multilayer composite liner to prevent leachate escaping to the environment. The schematic arrangement of the layers of the C-cell's composite liner is shown below.




Leachate is prevented from leaving the cell (other than through the collection pipes) by the upper HDPE membrane, which is underlain by a geosynthetic clay liner. The HDPE membrane is protected from punctures by a cushioning geotextile.

Leachate collects above the upper HDPE membrane in a washed stone aggregate layer and enters a herringbone pattern network of slotted leachate collection pipes within that aggregate and it is then pumped to the leachate treatment facility.

As a backup there is a bottom HDPE liner and drainage net underneath the geosynthetic clay liner to detect any leakage from the upper layers and to collect any escaped leachate. This backup layer is not required by the Sustainability Guide design

[1] For example, depending on the waste type and the potential for future reprocessing, it may be better to remove it from the bins to make future recovery from the cell easier.

standard and the liner design therefore exceeds the standard. Groundwater will be maintained to be at least 5 m below this bottom layer by setting the design excavation depth of the cell, and by installing groundwater drawdown pumps around the cell as a contingency backup. This separation is to avoid hydrostatic pressure on the liner from below.

Under the backup liner, the native clay will be screened to remove sharp rocks then compacted, forming yet another barrier to leachate movement. The cell therefore has 4 leachate barriers, being the two impermeable HDPE membranes, the geosynthetic clay liner and the underlying compacted clay.

### How good are the cell liners?

Landfill HDPE membranes and geosynthetic clay liners are specifically designed and manufactured for use as leachate barriers. They have a service life of several centuries. The underlying compacted clay liner will last for many thousands of years.

Composite landfill liners are very tough and flexible. Once covered with 300 mm of soil or initial waste, they can be driven on by heavy machinery. They also can readily adjust to movement in the underlying ground. For example, composite landfill liners have survived magnitude 6.7 earthquakes undamaged (much larger than the 2011 Christchurch earthquake). These earthquakes had shaking energies more than 10,000 times greater than the largest earthquake (less than magnitude 4) ever recorded in southeast Tasmania[2].

### What will happen to the leachate?

Liquid waste will not be received by the C-cell. Leachate generation will therefore be from rain falling onto the cell and percolating down through the waste, plus some from moisture in the waste (eg. from sludges).

All leachate will be pumped to a leachate treatment system, which will be a combination of passive evaporation ponds and (if needed) active evaporator units. The active evaporators will be powered by landfill gas collected from the landfill facility's other (category B) landfill cells.

No leachate will be discharged to the environment. The condensed leachate brine and sludge from the evaporator ponds and units will be returned to the C-cell.

At the end of its operational life the cell will be closed and covered with an impermeable cap. With no rain infiltration the leachate will dry up and the dry cell will sit securely for centuries.

### How will performance be assured?

There are many levels of performance assurance, including:

1. The design rules for the C-cell represent international best practice
2. The EPA has assessed the DPEMP's concept design against the design rules and has confirmed that the rules are met and has imposed approval conditions to ensure that they will be implemented
3. Before the C-cell can be constructed a detailed design must be prepared by appropriately qualified and experienced experts
4. The approval conditions require that the design is then independently reviewed by other appropriately qualified and experienced experts
5. The EPA itself will then review the detailed design and will only approve the C-cell design for construction if all requirements are met
6. Southern Waste Solutions will then prepare tender documentation for the construction of the cell, which will require contractors to construct the cell in accordance with the approved detailed design
7. The tender documentation will include quality specifications for materials, including for the HDPE and geosynthetic clay liners
8. The specifications will require materials to be manufactured, quality tested and installed in accordance with applicable Australian Standards, with a particular focus on liner integrity against leakage (eg. liner testing for manufacturing imperfections and liner weld testing during installation)
9. Construction will be managed through a Construction Quality Assurance Plan and after construction a confirmation Post-construction Report must be prepared
10. Cell operation will be managed through an Operational Procedures Manual
11. Operating performance will be validated by ongoing monitoring of collected leachate and by inspection of the leakage detection witness sump
12. There will also be ongoing monitoring of groundwater surrounding the C-cell, both during operations and following cell closure.

[2] On the earthquake magnitude scale each 1 unit scale increase is approximately a 30 fold increase in energy