



DETERMINATION OF FINANCIAL ASSURANCE FOR LANDFILLS

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1. INTRODUCTION

Sections 19A(2A) and 21 of the Environment Protection Act 1970 ("the Act") enable a financial assurance to be required of an occupier of a landfill by works approval, licence or Pollution Abatement Notice. For new landfill sites, a financial assurance proposal must be submitted with the works approval application.

In all cases, the financial assurance is intended to provide a guarantee that the costs of remediation, site closure and post-closure liabilities are not borne by the community in the event of the occupiers of the premises abandoning the site, becoming insolvent, or incurring clean up costs beyond their financial capacity.

Since local government is protected by legislation from these risks, the mechanisms available to local government for providing a financial assurance are very different to those available to other landfill operators. This is discussed in further detail in section 6 "Financial assurance and local government". Nevertheless, the principles contained in the guideline for calculating the liabilities and costs of landfilling apply to all operators, and, accordingly, the guideline should be used to ensure that the costs and liabilities of landfilling are accounted for.

Financial assurance must be provided in accordance with Section 67B of the Act. This document provides

guidance on the procedure to determine the amount and form of financial assurance for landfill sites. All financial assurance proposals are expected to be in accordance with this guideline.

The guideline does not deal with prescribed waste landfills, and any remaining prescribed waste landfill will need to determine the appropriate level of financial assurance in consultation with EPA. Furthermore, the guideline does not deal with currently closed or unlicensed landfills; whilst financial assurance may be required of these landfills where a risk is identified, the need to provide a financial assurance and its level will be determined in consultation with EPA.

2. THIRD PARTY LIABILITY INSURANCE

A significant risk for a landfill operator's future viability is the potential for claims by third parties against the operator. If these claims are not covered by an adequate insurance policy then the cost of the claim borne by the landfill operator may bankrupt the operator. This would then result in the need for EPA to draw upon other elements of the financial assurance cover to ensure that the site is appropriately managed. To cover this liability, a landfill operator must have an adequate third party liability insurance. This is not part of the financial assurance package described below – EPA will require evidence of third party liability insurance at the application stage of a works approval or licence.



3. COMPONENTS OF FINANCIAL ASSURANCE

Financial assurance is a package made up of three components which address different aspects of the site operation, closure and post-closure liabilities:

- Remedial action;
- Site rehabilitation; and
- Site aftercare.

The financial assurance package must:

- Name EPA as the party able to draw on the financial assurance; and
- Be available to EPA regardless of whether it is required as a result of any deliberate or inadvertent act of the landfill operator or its agent.

3.1 Remedial action

Remedial action covers costs that may be incurred to address pollution or events that may lead to pollution during both the landfill operation and after its closure. This component will be called upon to prevent and remediate any pollution on and/or off site, and to prevent a recurrence during the assurance period. This is discussed in Section 6 below.

The typical factors to consider in remedial action cover are:

- Excessive leachate seepage through liner;
- Failure of leachate collection system;
- Escape of leachate from leachate dam;
- Surface water contamination within or beyond the boundary of the premises;

- Groundwater contamination within or beyond the boundary of the premises (except where the contamination is within a designated attenuation zone)
- Illegal dumping of hazardous and/or inappropriate waste;
- Subsidence of landfill batters;
- Underground migration of landfill gas;
- Significant and ongoing odour problems;
- Failure of gas extraction system;
- Landfill fires;
- Erosion of landfill cap; and
- Failure to establish/maintain vegetation cover on cap.

The most appropriate means of covering this component of the financial assurance is through a mutual fund approved by EPA, with the detail of the mutual fund discussed and approved by EPA in establishing such a fund. Mutual funds are likely to provide considerable cost benefits to fund members over other options whilst still covering the same level of risk. This is due to all members, in effect, insuring each other against potential liability.

Where a landfill operator is unwilling or unable to be part of a mutual fund, an individual financial assurance will need to be provided for remedial action. The default amount to be held for this component is calculated by the following formula. This calculation does not apply to operators in a mutual fund unless the fund managers elect to use the formula to derive the amount of cover that will be provided by the fund.



Remedial action component = \$200,000 + (16 x typical waste tonnage received)

The typical waste tonnage received for an operating landfill is the average tonnage of waste received over the past three years. For a new landfill, the typical waste tonnage received is the projected amount of waste to be received, and is based on information derived from analyses of the waste generated within the waste catchment area of the landfill. Such analyses include Regional Waste Management Plans. The tonnage will be reviewed every five years when the financial assurance is reviewed (see section 7), or where the tonnage received increases significantly. The landfill operator may seek a review of the financial assurance at any time.

Where the landfill operator believes that the default amount is inappropriate and that an alternate level should be provided, the landfill operator should conduct a quantitative risk assessment to ensure that the 95 per cent confidence limit on remedial action costs is provided. The risk assessment should cover all the factors listed above, the likelihood any of these events occurring and the likely remedial costs. Such a risk assessment should be conducted by an experienced environmental risk assessment practitioner, and the method of conducting the risk assessment should be made clear to the Authority, including all assumptions drawn to conduct the assessment.

3.2 Site rehabilitation

The site rehabilitation component is to cover the cost of works required to close the landfill. These works will include:

- capping and revegetation in accordance with legislative requirements and Best Practice Environmental Management Guidelines;
- installation of gas and leachate collection infrastructure where it is not installed progressively throughout the life of the landfill; and
- decommissioning of infrastructure no longer required.

This component is calculated directly for each landfill assuming the worst case of a third party needing to close the landfill. The cost estimate must provide for the rehabilitation of the largest area of the landfill that may be open (filled and uncapped) at any stage. For landfills that are progressively rehabilitated, this will cover approximately two cells (the current cell and the last cell). Where clay or other soil necessary for capping works is not available at the landfill site, the cost estimate must consider the purchase of this soil.

3.3 Site aftercare

Site aftercare entails the care of the landfill cap and pollution prevention infrastructure as well as an environmental performance monitoring program. Proper management of the old landfill site is required until the waste has stabilised or decomposed and is judged by EPA to no longer pose a threat to the environment. Unless it can be demonstrated that an alternative stabilisation period can be used, a default period of 30 years should be used in costing the post closure management. The cost estimate must provide for the total area of landfill filled at a given time; this component of financial assurance will typically



increase as the landfill is progressively filled. The estimation of site aftercare costs must consider the following aspects, taking into account anticipated CPI increases:

- Inspection of landfill cap and landfill infrastructure including leachate collection system;
- Repair of landfill cap and infrastructure;
- Landscape maintenance of vegetated landfill cap;
- Leachate treatment and/or disposal;
- Decommissioning of leachate storage ponds;
- Maintenance of groundwater monitoring bores and gas collection wells
- Ongoing extraction and management or usage of landfill gas; and
- Monitoring program for:
 - Groundwater;
 - Surface water;
 - Leachate; and
 - Landfill gas.

4. MEANS OF PROVIDING A FINANCIAL ASSURANCE

Section 67B(1) of the Act states that a financial assurance may be provided as:

- a letter of credit from a bank;
- certificates of title;
- personal and bank guarantees;
- bonds;
- insurance; and

- any other form of security that the Authority considers appropriate.

The remedial action component of the financial assurance is best suited to be covered by a mutual fund or insurance policy. EPA understands that insurance may not be available to some currently operating landfills because the risk of past practices causing future problems is too high for insurers to cover. If the operator is unable or unwilling to join a mutual fund, the operator will need to provide an assurance through alternate means. Where this is the case, landfill operators will need to discuss their options with EPA.

The site rehabilitation and aftercare components of financial assurance are best provided through purely financial measures such as a bank guarantee or an accumulating fund, however local government may have further alternatives available to it. In the case of new landfills, the development of the site rehabilitation and aftercare funds will be done on a site-by-site basis in consultation with EPA.

5. FINANCIAL ASSURANCE AND LOCAL GOVERNMENT

Local government exists in perpetuity and as a result cannot abandon a landfill site. Furthermore, through its ability to charge rates, local government is able to raise any amount of revenue required to clean up pollution caused by its operations. These are both contained in legislation. Accordingly, local government provides a fundamental level of assurance that it will not require State funding for costs arising from operating its landfills, however relying upon this legislative assurance without defining and planning for contingent liabilities is inappropriate because it may expose ratepayers to



marked rate increases to cover costs that could have been foreseen.

In many cases, councils have a good understanding of all of the costs of landfilling, and has established various mechanisms to cover these costs. Some of the mechanisms that have been suggested include:

- an accumulating fund to cover rehabilitation costs;
- a mutual fund to cover remedial action costs;
- a discounted group insurance scheme to cover remedial action costs; and
- financial planning strategies to cover rehabilitation and/or aftercare costs.

Where a council has gone through the process of evaluating and providing for all of the costs of landfilling, EPA will accept a description of the mechanisms proposed to cover the costs as the financial assurance for the landfill. This description should include the level of liability being covered, how the level was derived, and how the liability is to be covered.

Where local government has not yet considered the full costs of landfilling, including costs of remedial action, rehabilitation and aftercare, EPA in conjunction with the Office of Local Government and Municipal Association of Victoria has undertaken to provide assistance in the process of considering these costs. This will take the form of a tripartite program of working with each individual council to identify all of the costs arising from landfilling and develop an asset management plan to ensure that these costs are provided for when they arise. The magnitude of this program will depend upon the need within local government for such assistance,

and if a council wishes to be a part of this program, then this should be the basis of its financial assurance proposal to EPA.

6. TIMING OF INTRODUCTION OF FINANCIAL ASSURANCES

Financial assurances will be introduced across all landfill licence holders, with all financial assurances established by 30 June 2002. In order to provide EPA with a guide as to how it intends to provide this financial assurance, all licence holders of existing landfills will be required to submit a financial assurance proposal to EPA by 1 October 2001. For local government, this means that any financial planning mechanisms must be in place by 30 June 2002, with a statement provided by 1 October 2001 as to whether council intends to develop these mechanisms itself, or whether it intends to be a part of the assistance program offered by EPA, Office of Local Government and the Municipal Association of Victoria.

Any new landfill will be required to provide a financial assurance proposal as part of its works approval application. Financial assurance cover must be in place before a waste discharge licence is issued.

Unlicensed or currently closed landfills may be required to have a financial assurance where the site represents a long term, unacceptable risk to the environment. These will be dealt with on a case-by-case basis and required via the serving of a Pollution Abatement Notice.



7. DRAWING UPON, RE-ASSESSING AND DISCHARGING FINANCIAL ASSURANCES

During the life of a landfill, the landfill operator is expected to rectify any environmental damage caused by the landfill operations. This continues after the landfill has closed, with the operator expected to take any necessary measures to protect the environment. If the operator fails to act in an appropriate time or manner, or no longer exists in law, then EPA may draw upon the financial assurance. For this reason, the financial assurance would need to be provided in a form that guarantees its provision beyond the existence of the operator.

The financial assurance for every landfill will be reviewed every five years. More frequent reviews may be undertaken at EPA's discretion, in which case EPA will provide the landfill occupier with no less than 30 days notice in writing of the review. During these reviews, CPI increases will be taken into account in determining the appropriate level of financial assurance.

The landfill operator may apply to have the financial assurance amended or discharged at any time, in which case EPA will advise the operator of its decision on the application within 60 days of it receiving the application. The most likely scenario for a landfill operator seeking the amendment or discharge of a financial assurance is where rehabilitation works are completed to the satisfaction of EPA.

The assurance period may be longer or shorter than the default assurance period of 30 years after the closure of the landfill. If the landfill has been monitored and a risk assessment approved by EPA affirms that the landfill has not impacted on the

environment and that the landfill does not constitute a threat to the environment, then EPA may discharge the financial assurance before the default assurance period has concluded. The assurance period may be extended if a risk assessment conducted 30 years after landfill closure indicates that the landfill continues to pose a threat to the environment.

The following aspects would be considered in a risk assessment determining whether to amend or discharge the financial assurance:

- environmental performance (eg. verification that groundwater is not polluted);
- sensitivity of the environment;
- degree of waste stabilisation as reflected by the cessation of landfill gas and leachate generation; and
- cap integrity.



APPENDIX

Example 1

A relatively new, privately operated landfill is required to provide a financial assurance to EPA. The landfill accepts solid inert, putrescible wastes and low level contaminated soil. The landfill is licensed to accept waste in two stages comprising a total area of 26 hectares. Each stage is divided into a number of cells, each of which comprise 2ha. The landfill will receive more than 150,000 tonnes/year. It is sited in accordance with best practice siting measures, and will introduce best practice design

after two cells have been filled. The site will have clay, topsoil and a geomembrane for rehabilitation. Clay, gravel and topsoil are available on site. The site has never been prosecuted for licence breach.

1. Remedial action cost

The remedial action cost is calculated as:

$$200,000 + (16 \times 150,000) = \$2.6M$$

2. Site rehabilitation

Calculated based on the actual costs to rehabilitate a landfill, and summarised below. Total rehabilitation cost is calculated to be \$1,482,600.

Total landfill Area (m ²)	260,000		
Open landfill Area (m ²)	40,000		
Annual rainfall (m)	0.6		
Landfill immediate cover (m ³)	0.3	12,000 m ³	
Landfill low permeability cap (m ³)	0.6	24,000 m ³	
Soil sub-base	1	40,000 m ³	
Landfill Cap Topsoil (m ³)	0.3	12,000 m ³	
Cost per m ³ soil (clay)	\$5		
Cost per m ³ soil (topsoil)	\$2		
Cost per m ² geomembrane (installed)	\$20		
Cost of clay	\$0		
Cost of topsoil	\$0		
Total cost of soil			\$0
Construct cap (cart, compact & topsoil) (\$/m ²)	\$9		
Install geomembrane		\$800,000	
Total cost to construct earthen cap		\$360,000	
Quality control (10% of construction cost)		\$36,000	
Cost of cap			\$1,196,000
Cost gas collection well	\$8,000.00		
Number of Gas Wells	8		
Cost of gas wells		\$64,000	
Supply/Installation of gas collection system (\$/m)	\$40.00		
Pipe length (metres)	800		
Cost of gas collection pipes		\$32,000	
Cost of gas flare		\$30,000	
Total Gas Collection Costs			\$126,000
Grass per ha	\$10,000		
Total Revegetation Costs			\$40,000
Remove facilities and decommission services			\$50,000
Design and supervision of works (5% of cost of rehab cost)			\$70,600
Total Landfill Rehabilitation Costs			<u>\$1,482,600</u>



3. Site aftercare

Calculated based on the actual costs to manage a landfill for 30 years, and summarised below. Total aftercare cost is calculated to be \$981,000.

Aftercare period (years)	30		
Number of groundwater bores	6		
Bore maintenance/bore/year	\$200		
Total annual bore maintenance		\$1,200	
Sampling frequency/year	2		
Analytical Costs per sample	\$200		
Total annual analytical costs		\$2,400	
Annual sampling and reporting		\$2,000	
Total analytical costs			\$168,000
Number of gas collection wells (2/ha total area)	52		
Maintain gas collection well (\$/well/yr)	\$400		
Annual gas collection well maintenance		\$20,800	
Total gas collection costs over aftercare period			\$624,000
Cost per cap inspection and vegetation maintenance (\$/ha/yr)	\$600		
Cost of inspections			\$72,000
Restoration of partial settlement of cap			
Volume of addition soil (m ³) (10% of area)	4000		
Soil costs per cubic metre	\$2		
Total soil cost		\$8,000	
Transport costs per cubic meter (incl excavation+placement)	\$5		
Total transport costs		\$20,000	
Total cap restoration costs			\$28,000
Leachate treatment and disposal per ML	\$2,000		
Volume of leachate extracted over 10 years	24000		
Cost of treating leachate over 10 years		\$48,000	
Monthly Inspection of leachate ponds	\$100		
Inspection over aftercare period		\$36,000	
Pump Replacement		\$5,000	
Total Aftercare Costs (30years)			<u>\$981,000</u>

4. Summary

The financial assurance, and the forms in which it is provided, is summarised as follows:

Remedial action	\$2.6 million	Insurance policy
Site rehabilitation	\$1,482,600	Bank guarantee
Site aftercare	\$981,000	Accumulating fund



APPENDIX

Example 2

An existing landfill is required to provide a financial assurance to EPA. The landfill is a typical small council landfill which accepts solid inert and putrescible wastes only. The landfill operates as one large cell in a pit across a total area of 1.5ha. The landfill receives about 13,000 tonnes/year. It is sited in a water supply catchment, and therefore is not sited in accordance with best practice siting measures. It is unlined, however as it has now filled above the floor of the pit, none of the landfill can be constructed to best practice

Total landfill area (m ²)	15000		
Landfill Area (m ²)	15000		
Annual rainfall (m)	0.9		
Landfill immediate cover (m ³)	0.3	4500 m ³	
Landfill low permeability cap (m ³)	0.6	9000 m ³	
Soil sub-base	0.5	7500 m ³	
Landfill Cap Topsoil (m ³)	0.3	4500 m ³	
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Cost per m ³ soil (clay)	\$5		
Cost per m ³ soil (topsoil)	\$2		
Cost per m ² geomembrane (installed)	\$20		
Cost of clay	\$0		
Cost of topsoil	\$9,000		
Total cost of soil		\$9,000	
Construct cap (cart, compact & topsoil) (\$/m ²)	\$9		
Install geomembrane		\$0	
Total cost to construct earthen cap		\$135,000	
Quality control (10% of construction cost)		\$13,500	
Cost of cap			\$157,500
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Cost gas collection well	\$8,000.00		
Number of Gas Wells	0		
Cost of gas wells		\$0	
Supply/Installation of gas collection system (\$/m)	\$40.00		
Pipe length (metres)	0		
Cost of gas collection pipes		\$0	
Cost of gas flare		\$0	
Total Gas Collection Costs			\$0
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Grass per ha	\$10,000		
Total Revegetation Costs			\$15,000
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Remove facilities and decommission services		\$50,000	
Design and supervision of works (5% of cost of rehab cost)		\$11,125	
Total Landfill Rehabilitation Costs			<u>\$242,625</u>

design. The site will have a cap of clay (from site) and topsoil, and no gas collection system will be installed. The site was recently prosecuted and found guilty of licence breaches.

1. Remedial action cost

The remedial action cost is calculated as:

$$200,000 + (16 \times 13,000) = \$408,000$$

2. Site rehabilitation

Calculated based on the actual costs to rehabilitate a landfill, and summarised below. Total rehabilitation cost is calculated to be \$242,625.



3. Site aftercare

Calculated based on the actual costs to manage a landfill for 30 years, and summarised below. Total aftercare cost is calculated to be \$237,500.

Aftercare period (years)	30		
Number of groundwater bores	4		
Bore maintenance/bore/year	\$200		
Total annual bore maintenance		\$800	
Sampling frequency/year	2		
Analytical Costs per sample	\$200		
Total annual analytical costs		\$1,600	
Annual sampling and reporting		\$2,000	
Total analytical costs			\$132,000
Number of gas collection wells	0		
Maintain gas collection well (\$/well)	\$400		
Annual gas collection well maintenance		\$0	
Total gas collection costs over aftercare period			\$0
Cost per cap inspection and vegetation maintenance (\$/ha/yr)	\$600		
Number of inspections during aftercare period	30		
Cost of inspections			\$27,000
Restoration of partial settlement of cap			
Volume of addition soil (m ³) (10% of area)	1500		
Soil costs per cubic metre	\$2		
Total soil cost		\$3,000	
Transport costs per cubic meter (incl excavation+placement)	\$5		
Total transport costs		\$7,500	
Total cap restoration costs			\$10,500
Leachate treatment and disposal per ML	\$2,000		
Volume of leachate extracted over 10 years	13500		
Cost of treating leachate over 10 years		\$27,000	
Monthly Inspection of leachate ponds	\$100		
Inspection over aftercare period		\$36,000	
Pump Replacement		\$5,000	
Total Aftercare Costs (30years)			<u>\$237,500</u>

4. Summary

The total financial assurance is summarised as follows:

Remedial action	\$408,000	Mutual fund
Site rehabilitation	\$242,625	Accumulating fund
Site aftercare	\$237,500	Works budget funded by council garbage rates