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Background Note

Financial Provision (Financial Assurance) for Remediation, Closure and Long-Term Aftercare of Municipal Waste Landfills

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1 Overview

1.1 Introduction

This note summarises information on the approaches used for financial provision for the future costs of municipal waste landfill closure, aftercare and remediation in the United States, England and Wales, and Australia. This section summarises the main findings and considers their implications for municipal landfills in Ukraine. Sections 2-4 contain the country summaries and Section 5 outlines the main financial mechanisms used for financial provision.

“Operator” refers to an entity licensed or permitted by the competent body to operate a landfill site (also referred to as “license holder”). The term “regulatory agency” is used to describe the competent state entity responsible for municipal solid waste management. As used in the document, “operator” refers equally to “owner and / or operator”. The terms “permit” and “license” are used synonymously. Performance agreement refers to the set of undertakings agreed to by an operator when it accepts a license to operate a landfill; such undertakings commonly also form part of the agreements entered into by the operator for financial provision.

1.2 Summary Points

Although no realistic applicant for a landfill licence should have difficulty in providing evidence that appropriate plans have been made to obtain external funding to meet the immediate obligations of the licence, long-term funding to meet closure and post closure obligations requires evidence of more specific provision. This includes remediation (clean-up) costs in the event of specified events occurring during the licence period.

The financial provision (also referred to as financial assurance) for a landfill aims to provide a guarantee that the costs of remediation, site closure and post-closure liabilities are not borne by the community in the event that the operator abandons the site, becomes insolvent or incurs clean-up costs beyond its financial capacity.

A risk for the future viability of a landfill operator is the potential for claims by third parties against it. Unless these claims are covered by adequate insurance the cost of the claim may bankrupt the operator. Such third party insurance *does not* form part of the financial provision. Evidence of third party liability insurance should be a requirement of the licence application at the approvals stage.

Demonstration of adequate financial provision is needed to determine whether an entity is a “fit and proper person” to operate a landfill. Financial provision must be in a form acceptable to the Competent Agency. Arrangements for financial provision must be in place before disposal operations commence. Financial provision must be adequate to discharge the obligations of the operating permit for as long as the landfill poses a hazard.

Financial provision is typically needed to cover (i) costs arising from uncertain incidents specified in the permit conditions (referred to as corrective actions, specified events and remedial actions in the country reviews); (ii) landfill closure costs; and (iii) landfill aftercare costs. A contingency can also be required to cover costs arising from uncertainty over the exact timing of landfill permit surrender.

Obligations on the landfill operator typically continue beyond landfill closure, whereby the operator is expected to take any measures necessary to protect the environment. If the operator fails to take the requisite action, or no longer exists in law, then the Competent Agency may draw upon the financial assurance. Financial assurance must therefore be provided in a form that guarantees its

provision beyond the existence of the operator. The financial assurance package must therefore name the Competent Agency as the party able to draw on the financial assurance.

Operators are not usually expected to build up contingency funds to meet remediation costs following unforeseen pollution incidents. However, where licence conditions impose specific obligations in the event of specified occurrences, such as the failure of containment measures leading to the pollution of a watercourse, operators must show that they have appropriate plans to meet the costs involved. Provision for corrective actions covers *costs that may be incurred* to address pollution or events that may lead to pollution during landfill operation and after its closure.

The operator must decide what the likely duration of the aftercare period will be. Financial provision must generally be in place for at least 30 years following landfill closure. Permit documents typically provide for this period to be shortened or extended. The Environment Agency of England and Wales considers an aftercare period of 60 years together with a contingency fund to be appropriate. The contingency is needed to cover uncertainty over precisely when the permit will be surrendered.

Closure and post-closure cost estimates are prepared prior to commencement of facility operations. An expenditure profile is prepared for the landfill's operating life such that the total amount grows to a maximum at site closure when risk is likely to be highest. The total financial provision must be accrued over this period. The adequacy of the financial provision is kept under continual review and is adjusted annually until all post-closure monitoring and maintenance has ceased.

There is typically a strict requirement to ensure that sufficient funds are at all times available under the worst case to cover costs of immediate third-party closure of the site, third-party post-closure care and third-party performance of corrective actions needed to address any known releases.

An assessment of the potential risks to the landfill and their associated costs over the operating, closure and aftercare phases is provided as part of landfill application. Operators must demonstrate their ability to meet all potential financial liabilities, including corrective actions / specified events involving systems failure, during the operational and post-operational phases.

Financial provision is calculated in today's prices (excluding inflation) and is adjusted annually during the active life of the facility to account for inflation. Future expenditures must not be discounted to net present values. Proposals for discounting will only be considered where there is a proven real rate of return on the funds (which does not compromise their security or availability) after a realistic assessment of the effect of inflation.

Mechanisms for financial provision are not prescribed by the regulatory agency. Mechanisms are assessed on a case-by-case basis against three main criteria: the funds must be sufficient, secure and available. Mechanisms are examined for financial risk and to ensure that the funds cannot be diverted for other purposes. Mechanisms must be sufficiently flexible to allow access to them in the event of premature or delayed closure of the landfill.

Mechanisms used internationally include escrow accounts, surety (renewable) bonds, insurance policies and mutual funds, and various forms of financial guarantee.

Funds must be available in the very long term to cover the costs of closure, post-closure and specified events that may or may not occur after landfill closure. Escrow accounts or bonds are possibly the most secure means of meeting these long-term obligations. Insurance or mutual funds may be more appropriate for uncertain events (specified actions) where the risk is small but the potential cost is high.

Local authorities must ensure that sufficient financial provision is maintained. Legislation usually recognises that local government exists in perpetuity and as a result cannot abandon a landfill site (although local authorities can go bankrupt). However, the principles for calculating the liabilities and costs of landfilling should be equally applicable to all operators, whether private or public.

1.3 Implications for Landfills in Ukraine

Financial provision typically covers three categories of liability:

- Remediation costs (referred to as “corrective action” in the US, “specified events” in England and Wales and “remedial action” in Australia)
- Landfill closure costs
- Landfill aftercare costs

As noted, a “contingency sum” can also be required to ensure that once the estimated aftercare period is over funds will continue to be available until the landfill permit is finally surrendered.

Financial provision mechanisms must satisfy the core conditions that the mechanism is secure, the amount of funds is sufficient and the funds are available when needed.

Limited development of markets for the kinds of mechanisms referred to above may limit their availability to landfill operators in Ukraine.

The precise treatment in the tariff calculation methodology of mechanisms for financial provision should be defined once the scope for using them has been established. Expenditure building up cash deposits held in escrow could be treated as a form of opex since the expenditure does not represent a call on the operator’s resources (the funds are provided over time by users of the service); any initial capitalisation of a cash deposit by the operator prior to the commencement of operations could be treated as a form of capex to be depreciated over an appropriate period (not necessarily the whole life of the landfill). Costs of establishing and maintaining bonds, insurance and guarantees would be treated as opex.

Factors to consider concerning the financial provision are:

- The financial provision is normally reviewed annually and adjusted to reflect changes in costs and operational characteristics. An uplift in the provision may be required at this time.
- The initial cost information is specified in the values of the day and is not adjusted for inflation. This is because inflation cannot be forecast with any degree of certainty. Inflation adjustments are usually made annually in arrears.
- Projections of future costs are not usually discounted. This is consistent with the core criteria for financial provision: it must be secure, the funds must be sufficient and the funds must be available when needed.

The use of discounted values for setting prices assumes that the revenues raised can be invested at the discount rate. This cannot be guaranteed. Investments of this kind face financial risk and would hence be in conflict with the core conditions.

These factors influence the amount of revenue needed per tonne of waste to realise the financial provision and to satisfy the adequacy, security and availability conditions. This applies particularly when funds are accumulated over landfill life to meet closure and aftercare obligations.

A zero real discount rate may be needed to satisfy the three conditions. This means that the total funds needed to cover landfill closure and long-term aftercare costs have to be provided directly by

users (and not partly by investment income). To put this in perspective, the average unit cost per tonne of waste over a 30-year operating period is four times higher if costs are discounted at 0% rather than at 8%. This has considerable implications for the proportion of the tariff needed for financial provision.

The cost per tonne of landfill closure and aftercare can be high. For example, an Australian study puts these costs at between AUS \$4.5 (UAH 36) – AUS \$13 (UAH 104) / tonne in 2006 (the details of how the costs were calculated were not available). One reason for the relatively high cost of landfill closure and aftercare is that the composition of a typical municipal landfill makes it unstable. Under a regime of strict landfill control and management these costs could be lowered.

For example, by strictly controlling organic material – with only material that is close to being inert allowed to be landfilled – stability risks can be significantly reduced. Stabilisation (which also results in lower landfill gas emissions) is one of the main justifications for requiring waste to be thermally or biologically treated (e.g. aerobic treatment equivalent to composting) prior to its disposal to landfill. By ensuring that waste is as far as possible inert, the landfill is exposed to fewer risks and lower closure and aftercare costs.

Putting greater effort into pre-treatment today means greater confidence and lower risk in the future. This is important if users today will be required to face the full future costs of their current landfill use. In addition, waste pre-treatment prior to disposal can be expected to increase the effective capacity and life of landfill.

2 Financial Assurance for Landfills in the United States

2.1 Overview

Federal and State regulations include strict requirements for financial assurance to confirm that sufficient funds will be available at all times to cover (in the worst case) the costs of immediate third-party closure of the landfill site, third-party post-closure care and third-party performance of corrective actions needed to address any known releases.

Financial assurance should be provided using an allowed mechanism (e.g. trust fund, surety bond, letter of credit, or insurance policy; or by demonstration that specific financial tests are met).

Financial assurance documents for both operating and closed facilities are updated annually until post-closure monitoring and maintenance has ceased. Landfills are not permitted to operate without providing these assurances.

Operators of municipal solid waste landfills must demonstrate that they will be able to pay for the required closure and post-closure care activities, and for any corrective action that might become necessary due to releases of contaminants into the surrounding environment.

2.2 Accounting for Municipal Solid Waste Landfill Closure and Post-Closure Care Costs

Statement No. 18 on Accounting for Municipal Solid Waste Landfill Closure and Post-Closure Care Costs prepared by the US Governmental Accounting Standards Board, August 1993, provides a good general reference to the accounting process. Key points in summary:

EPA Rule October 9, 1991 establishes closure requirements for all municipal solid waste landfills and thirty-year post closure care requirements. The rule obligates landfill owners and operators to

perform closing functions and post closure monitoring and maintenance functions as a condition for the right to operate the landfill.

The Statement applies to state and local governmental entities. Costs which result in disbursements near or after the date that the landfill stops accepting solid waste and during the post-closure period should be included in the *estimated total current cost of landfill closure and post-closure care*, regardless of their capital or operating nature. The estimated total current cost of landfill closure and post-closure care should include:

- The cost of equipment and facilities expected to be installed or constructed near to or after the date that the landfill stops accepting solid waste and during the post-closure period. Equipment and facilities should be limited to items that will be used exclusively for the landfill. Examples are gas monitoring and collection systems, storm-water management systems, groundwater monitoring wells and leachate treatment facilities.
- The cost of final cover (capping) expected to be applied near to or after the date that the landfill stops accepting solid waste.
- The cost of monitoring and maintaining the expected usable landfill area during the post-closure period. Post-closure care may include maintaining the final cover; monitoring groundwater; monitoring or collecting methane and other gases; collecting, treating, and transporting leachate; repairing or replacing equipment and facilities; and remedying or containing environmental hazards.

Current cost is defined as the amount that would be paid if all equipment, facilities, and services included in the estimate were acquired during the current period. After the initial calculation, current cost is required to be adjusted annually for the effects of inflation or deflation and other changes. The effect of any changes in estimates that occur before the landfill stops accepting solid waste is required to be reported primarily in the period of change.

A portion of the estimated total current cost is required to be recognized as an expense and as a liability in each period that the landfill accepts solid waste and is completed by the time it stops accepting waste.

Estimated total current cost should be assigned to periods based on landfill use rather than on the passage of time. When all capacity has been used, the entire liability for closure and post-closure care costs should have been recognized (regardless of whether this happens in ten years or forty years.)

Capital assets used for a single cell should be fully depreciated by the date that each cell is closed.

Entities are required to disclose:

- the nature and source of landfill closure and post-closure care requirements
- the nature of closure and post-closure care estimates
- the reported liability at the balance sheet date
- the estimated total closure and post-closure care cost remaining to be recognized
- the percentage of landfill capacity used to date
- the estimated remaining landfill life in years

Entities also are required to disclose how closure and post-closure care financial assurance requirements are being met.

Equipment and facilities included in the estimated total current cost should not be reported as capital assets. Equipment, facilities, services, and final cover included in the estimated total current cost should be reported as a reduction of the accrued liability for landfill closure and post-closure care when they are acquired.

If capitalized, facilities and equipment installed or constructed for a single cell should be depreciated over the estimated useful life of that cell.

The effect of any changes in the estimated total current cost of closure and post-closure care that occur before the landfill stops accepting solid waste is reported primarily in the period of change. However, the cost of changes in closure and post-closure care requirements that affect only horizontal expansions of the waste boundaries of an existing landfill should be recognized as capacity in those new areas is used.

Changes in the estimated total current cost of landfill closure and post-closure care may occur after the date that the landfill stops accepting solid waste. These may include increases or decreases in costs due to inflation or deflation, changes in technology, changes in closure and post-closure care requirements, corrections of errors in estimation, and changes in the extent of environmental remediation required. Changes in these estimates should be reported in the period in which the change is probable and reasonably estimable.

Landfill owners or operators are required to provide financial assurances for closure, post-closure care and remediation by placing assets with a third-party trustee or in a surety standby trust. Investment earnings on amounts set aside to finance closure and post-closure care should be reported as revenue, not as reductions of the estimated total current cost of landfill closure and post-closure care and related accrued liability.

Page 4 of the document sets out the formula to be used in calculating the provision for the current period and Appendix C provides illustrative examples of the calculations in practice.

2.3 Closure and Post-Closure Care Requirements

The first step in demonstrating financial assurance is to prepare a written, site-specific cost estimate. Closure and post-closure care cost estimates are prepared prior to commencement of facility operations and must be adjusted annually during the active life of the facility to account for inflation. Corrective action cost estimates are prepared when a release is detected, and must be adjusted annually over the duration of the correction action. All cost estimates are calculated based upon hiring a third party to perform the required action.

A closure plan must be prepared that describes the steps needed to close the landfill in accordance with the closure requirements. This plan must include:

- A description of the final cover design and its installation methods and procedures
- An estimate of the largest area of the landfill requiring a final cover
- An estimate of the maximum inventory of waste on site during the landfill's active life
- A schedule for completing all required closure activities

Post-closure care activities consist of monitoring and maintaining the waste containment systems and monitoring groundwater to ensure that waste is not escaping and polluting the surrounding environment. The required post-closure care period is 30 years from site closure, but this can be shortened or extended by the director of an approved state program as necessary to ensure protection of human health and the environment.

Post-closure care is needed to maintain the effectiveness of the:

- Final cover system
- Leachate collection system
- Groundwater monitoring system
- Methane gas monitoring system

A post-closure care plan must be prepared that provides:

- A description of monitoring and maintenance activities
- Contact details during the post-closure care period
- A description of planned uses of the land during the post-closure care period

2.4 Financial Assurance Mechanisms

There are several allowable financial assurance mechanisms described in the regulations that an operator may use alone, or in combination, to demonstrate that they meet the closure and post-closure care financial assurance requirements. The allowable mechanisms are:

- Trust fund
- Surety bond guaranteeing payment or performance
- Letter of credit
- Insurance
- Corporate financial test
- Local government financial test
- Corporate guarantee
- Local government guarantee
- State-approved mechanism
- State assumption of responsibility

They must satisfy the following criteria:

1. The amount of funds assured is sufficient to cover the costs of closure, post-closure care and corrective actions for known releases when needed
2. The funds will be available when needed
3. The mechanisms are legally valid, binding, and enforceable under state and federal law

Details of all of these mechanisms can be found in the source document linked below. The principal mechanisms are described in Section 6.

Further details, including details of these mechanisms can be found at:

<http://www.epa.gov/osw/nonhaz/municipal/landfill/financial/famsw.htm>

3 Financial Provision for Landfills in England and Wales

3.1 Introduction

Article 28 of the EU Landfill Directive 1999 makes operators of landfill sites in the EU responsible for the closure and aftercare of their sites. In meeting this obligation the operator must put in place adequate provision by way of financial security. Landfill permitting comes under The Environmental Permitting (England and Wales) Regulations 2010 and is a responsibility of the Environment Agency.

The Agency is legally obliged under the Regulations to ensure that waste companies have sufficient resources available to address the environmental and human health impacts of their waste activity. Arrangements for financial provision must be in place before disposal operations can commence. The Agency must be satisfied that an applicant for a landfill permit is a “fit and proper person” before it grants a permit; this includes the ability of the applicant to provide *adequate* financial provision for discharging the obligations of the permit for as long as the landfill poses a hazard.

3.2 Calculating the Financial Provision

The operator must decide what the likely duration of the aftercare period will be. The Landfill Directive (Article 10) states that financial provision must be in place for at least 30 years following the closure of the landfill. It also states: ‘This security or its equivalent shall be kept as long as required for maintenance and after-care operation of the site’.

The Environment Agency considers it appropriate to estimate detailed costs for an aftercare period of 60 years, with a contingency fund available thereafter. It considers this to be a reasonable period during which the operator is likely to have to maintain operational controls over the site, in terms of leachate and landfill gas management.

The calculation must include a ‘contingency’ sum. This is to ensure that once the estimated aftercare period is over funds will continue to be available in the event that continued site management is needed. The contingency sum must be available until the permit is surrendered. Any residual cash sum remaining after surrender is returned to the operator.

The financial provision is calculated at today's prices. Inflation is not recognised when the provision is calculated. The Agency will regularly review the financial provision to account for inflation as defined in the performance agreement that forms part of the licence and will require an annual uplift for inflation as necessary.

Future expenditures must not be *discounted* to net present values. Proposals for discounting will only be considered where there is a consistent and proven real rate of return on the funds (which does not compromise their security or availability) after a realistic assessment of the effect of inflation.

The calculation of financial provision is broken down into the following cost headings:

- a) Environmental monitoring
- b) Capping and restoration
- c) Cap maintenance
- d) Leachate management
- e) Landfill gas management
- f) Surface water management
- g) Security
- h) Specified events

The operator must explain the assumptions made in the calculation of the costs for each component. Examples of cost calculations can be found in Appendix 1 to the reference document (see below).

As provision is being made for future expenditures, a ‘cost profile’ must be provided and not just the total amounts. The ‘cost profile’ shows the pattern of future costs which builds up during the operational phase of the site to a maximum at site closure, when risk is likely to be highest. Costs then drop as the fund is spent on aftercare.

Risk assessments which identify the hazards and potential risks associated with a particular site must be provided as part of the landfill application. These must include an estimate of the size of the hazard and of the potential impact on the environment should control measures fail, taking into account the likelihood of their occurrence. These are referred to as “specified events”. Where a permit requires landfill gas, surface water, groundwater and / or leachate management, financial provision must be made for maintenance, repair and replacement of the relevant infrastructure depending on the likelihood of its failure.

3.3 Demonstrating the Financial Provision

The operator must make financial provision in a form acceptable to the Agency to cover any environmental liabilities incurred by the operator. The Agency does not prescribe how financial provision should be made and will consider any mechanism that meets the following criteria:

- The amount is *sufficient* to cover the obligations of the landfill permit
- The mechanism is *secure* for the duration of the permit
- The money is *available* when required

The financial provision must be *sufficient* to meet all of the obligations of the permit, including closure and aftercare obligations and cover against specific events identified in the risk assessment.

The financial provision must be *secure* for the duration of the permit so that funds are available to discharge the obligations of the permit. The Agency will consider any *financial risk* in relation to the mechanism chosen and ensure that the funds cannot be diverted for any other purpose.

The operator must be able to access the funds to discharge the obligations of the permit as and when they are needed: they must be *available*. Rules of access to the funds are set out in a legal agreement between the operator and the Agency. The mechanism must be sufficiently flexible to allow access to funds should there be premature or delayed closure of the landfill.

Irrespective of the time estimated for aftercare, the calculation of financial provision must include a ‘contingency’ sum. This is to ensure that once the period estimated for managed aftercare is over, funds are available should continued site management be necessary. The contingency sum must be available until the permit is surrendered. If managed aftercare is unnecessary at the end of this period the operator can apply to surrender the permit. If the surrender application is accepted any residual cash sum will be returned to the operator.

The principal mechanisms accepted as demonstrating financial provision are:

- Escrow accounts
- Renewable bonds
- Cash deposits with the Agency
- Local Authority Deed Agreement
- Trust-based investment portfolios

Definitions of these mechanisms are included at Appendix 1 below.

Further details of the approach to Financial Provision in England and Wales can be found in “Guidance on Financial Provision for Landfill”, Environment Agency, 2011. This can be downloaded at

[http://www.environment-agency.gov.uk/static/documents/Business/Guidance - financial provision for landfill.pdf](http://www.environment-agency.gov.uk/static/documents/Business/Guidance_-_financial_provision_for_landfill.pdf)

4 Financial Assurance for Landfills in Victoria, Australia

Australian legislation requires financial assurance from landfill operator. For new sites this must be submitted with the works approval application. 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. The principles for calculating the liabilities and costs of landfilling are equally applicable to all operators, whether private entities or public.

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, the operator is required to have an adequate third party liability insurance. This *does not* form part of the financial assurance package. The Victorian Environmental Protection Agency (EPA) requires evidence of third party liability insurance at the application stage of a works approval or licence.

4.1 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 (closure)
- Site aftercare

The financial assurance package must name EPA as the party able to draw on the financial assurance and be available to the EPA regardless of whether it is required as a result of any deliberate or inadvertent act of the landfill operator or its agent.

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.

Typical risk 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
- 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 net 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 must be provided for remedial action. The default amount to be held for this component is calculated according to a formula specified by the EPA. Details can be found in the source document.

Site rehabilitation

The site rehabilitation component of the financial assurance is to cover the cost of works needed to close the landfill. These include:

- Capping and revegetation in accordance with legislative requirements and Best Practice Environmental Management Guidelines
- Installation of gas and leachate collection infrastructure where it has not been installed progressively throughout the life of the landfill
- Decommissioning of infrastructure when no longer required

This component is calculated directly for each landfill assuming the worst case of a third party having responsibility for closing the landfill. The cost estimate must provide for rehabilitation of the largest open area of the landfill (filled and uncapped) at any stage.

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 is required until the waste has stabilised 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 is 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
- Monitoring program for groundwater, surface water, leachate and landfill gas

4.2 Means of Providing Financial Assurance

Financial assurance may be provided as:

- Letter of credit from a bank
- Certificates of Title
- Personal and bank guarantees
- Bonds
- Mutual fund or insurance policy
- Any other form of security that the EPA considers appropriate

The remedial action component of financial assurance is best suited to be covered by a mutual fund or insurance policy. Insurance may not be available to some currently operating landfills due to the risk of poor past practice being too high for insurers to cover. If the operator is unable or unwilling to join a mutual fund, an individual financial assurance must be provided for remedial action.

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

4.3 Financial Assurance and Local Government

Australian legislation recognises that 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 the funds needed to clean up pollution caused by its operations. Accordingly, local government provides a fundamental level of assurance that it will not require State funding for costs arising from its landfill operations. However, relying upon this legislative assurance without defining and planning for contingent liabilities is considered inappropriate as it may expose ratepayers to high rate increases to cover costs that could have been foreseen.

Local government has established various mechanisms to cover these costs:

- a mutual fund to cover remedial action costs
- a discounted group insurance scheme to cover remedial action costs
- an accumulating fund to cover rehabilitation costs
- 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.

4.4 Drawing Upon, Reassessing and Discharging Financial Assurances

The landfill operator is expected to rectify any environmental damage caused by the landfill operations during the life of the landfill. This continues beyond landfill closure, whereby the operator is expected to take any measures necessary to protect the environment. If the operator fails to take the requisite action, or no longer exists in law, then the EPA may draw upon the financial assurance.

Financial assurance must therefore be provided in a form that guarantees its provision beyond the existence of the operator. Financial assurance for every landfill is reviewed every five years. More frequent reviews may be undertaken at EPA's discretion. Consumer Price Index (CPI) increases are taken into account during the review to determine the appropriate level of financial assurance.

The assurance period may be longer or shorter than the default assurance period of 30 years after landfill closure. If the landfill has been monitored and a risk assessment approved by EPA affirms that it has not affected, or 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 source document on which the above review is based, Determination of Financial Assurance for Landfills, EPA Victoria, 2011, is at <http://www.epa.vic.gov.au/~media/Publications/777.pdf>

The source document contains useful example calculations of remedial action costs, site rehabilitation costs and site aftercare costs.

5 Forms of Financial Provision used Internationally

The regulator will seek assurance that the financial provisions proposed by a landfill operator will satisfy the need to cover long-term costs of closure, post-closure and correction (remedial or specified events) costs over the foreseeable operational and aftercare periods of landfill life. The operating entity must disclose how these financial assurances will be met. As the period for which financial provision may be required can be anywhere between fifty and a hundred years, it is conceivable that the operating entity may not survive this period. Financial provision must therefore be set aside with a form of third-party trust to ensure that the funds will be available to the regulator to meet future obligations. Escrow accounts and surety bonds are the principal mechanisms through which this is done.

Several allowable forms of financial assurance mechanisms have been referred to in the review, some of which fulfil similar roles. The following general mechanisms are described here.

- Escrow accounts
- Surety bonds and letters of credit
- Insurance and mutual funds
- Financial guarantees

Further details of the specific mechanisms referred to in the text can be found in the source document for the country in which the reference was made.

5.1 Escrow accounts

An escrow account is a bank account to which access is triggered by specified events. It is typically a joint account between the operator and the regulatory agency secured under a Deed of Trust (Trust Fund) agreement and bank mandate to ensure that the funds are only accessed for the required purposes. The mandate is signed by the operator, the bank and the regulator and is intended to ensure that there can be no dispute at a later date. Escrow accounts are normally cash-based although government backed securities can also be acceptable. Interest accruing on these deposits may offset an annual uplift for inflation (depending on the rate of return).

The escrow account should be reviewed regularly (at least annually) to ensure that the amounts deposited reflect the future closure and post-closure expenditure profile as the landfill becomes progressively more utilised. The required sum is typically subject to an annual Retail / Consumer

Price Index (RPI/CPI) adjustment as per the performance agreement. The regulator usually carries out this calculation.

To withdraw sums for works carried out under the permit the operator must present contractors' invoices as evidence. Where there is an unplanned major withdrawal (e.g. for a specified event / corrective action) the sum taken out affects the financial profile of the account. At that time the overall sum should be reviewed and, if necessary, a top up (i.e. the deposit of additional funds) may be required.

The regulator must ensure that the value of the deposit is in line with the agreed expenditure profile. The expenditure profile of the escrow can be calculated upon a rate per tonne according to the anticipated input rate to the site. The waste input rate is therefore reviewed periodically to ensure that cash available in the escrow meets the potential liability at the particular point in time. The rate per tonne should also be adjusted annually to ensure that its value is not eroded by inflation.

Escrow accounts are a suitable means for making short and long term financial provision.

5.2 Surety Bonds

A surety bond provides a guarantee that the landfill operator will fulfil its contractual obligations to the regulatory agency. As a legally binding contract it creates financial security for the regulator. A surety bond binds three parties:

- The principal: the landfill owner or operator that purchases the bond to guarantee that commitments entered into in the landfill operating permit will be met.
- The beneficiary: the regulatory agency responsible for regulating the industry and approving the proposed financial provision.
- The surety (also bondsman or guarantor): the company (bank or insurance company) that issues the bond on behalf of the landfill operator, thereby providing a financial guarantee that the operator will meet its obligations to the regulator as required by permit and/or law.

The bond has to be filed with the regulatory agency before a license can be obtained. In the event that the operator fails to meet the terms of the bond (which reflect the liabilities arising from the operating permit) the regulatory agency can file a claim against the bond with the surety provider. If valid, the surety provider will compensate the regulator, either via the landfill operator or directly.

Bonds can be operated in a manner similar to escrow accounts with regard to the value of the bond. An expenditure profile defines the potential exposure to financial liability at any point during the life of the permit. The bond may be for a fixed sum or an incremental sum, rising or falling as the liability on the site increases or decreases. In either case, the sum should be subject to an annual adjustment for inflation as specified in the operator's permit or similar.

Unlike an escrow account, where the value of the provision may be related to the tonnage of waste deposited (and therefore is not necessarily predetermined) the incremental bond follows a profile agreed at the outset and which is normally documented in a schedule to the permit, performance agreement or similar. It is still necessary to review the input rate to the landfill and confirm annually that the estimated liability is adequately covered by the value of the bond at any point in time.

Bonds are normally provided at a price by a financial institution (bank or insurance company). The premium charged is based on several factors, including the applicant's credit rating and financial

history, the specific bond needed and the surety provider's underwriting costs. High-risk bond rates can be a significant portion of the bond amount.

A similar form of guarantee is the Letter of Credit, whereby the operator obtains an irrevocable standby letter of credit from an institution that has the authority to issue such letters and whose operations are regulated and examined by a competent state agency. The letter of credit must be equal to the amount of the current cost estimate for closure, post-closure care, and/or corrective action.

5.3 Insurance and Mutual Funds

Operators in the United States may obtain an insurance policy for a face value amount (the total amount the insurer is obligated to pay under the policy) that is at least equal to the cost estimate for closure and/or post-closure expenses. The policy must guarantee that the funds required will be available to close the unit and/or provide the required post-closure care at the appropriate time.

Such insurance is also a valid mechanism for covering contingencies (specified events, corrective actions, remedial actions) that occur over the operational life of the landfill (since maintaining the insurance policy becomes a license condition) but it is difficult to know how insurance would cover these costs after landfill closure, particularly in the situation where the operator no longer exists and hence cannot maintain a policy.

Financial assurance can also be provided through participation in a mutual fund approved by the competent authority. A mutual fund is a fund set up and paid into by a group of landfill operators to take over responsibility for landfills after completion. It is a form of mutual insurance into which all members contribute, in effect, insuring each other against potential liability.

Australia appears from the literature to be the country with most experience in using this kind of mechanism, where it is considered to be the most appropriate means for covering the uncertain costs of remedial action. Mutual funds are considered likely to provide considerable net benefits to fund members over other options whilst still covering the same level of risk.

5.4 Financial Guarantees

Various forms of financial guarantees exist whereby an operator may obtain a written guarantee from another company (the guarantor) to meet the closure, post-closure care, and/or corrective action financial assurance requirements. These are likely to suffer from similar concerns as those associated with insurance and mutual funds in that the guarantor may not survive the life of the landfill and the post closure reparation and monitoring period.