Environment Protection Authority

Instructions for E-RAMP

Environmental risk assessment and mitigation package for small waste facilities (version 4.0)

Contents

The NSW Environment Protection Authority (EPA) has developed the Environmental Risk Assessment and Mitigation Package (E-RAMP) software to help small waste facility operators assess and manage potential issues at their sites.

Operators of small waste facilities (primarily local councils) are presented with the challenge of providing an essential service that meets the community's expectations, often with limited budgets and resources, while at the same time minimising the environmental impacts.

E-RAMP was developed, after consulting with council waste managers across NSW, to provide guidance in undertaking a risk analysis and prioritising mitigation plans for smaller waste facilities, and to support councils' decision-making processes. The package was first developed in 2008 and updated in 2014 and in 2023 to incorporate relevant changes.

Background

Since the introduction of the *Protection of the Environment Operations Act 1997*, operators of large waste facilities, such as landfills and transfer stations, have required Environment Protection Licences (EPL) to conduct their operations. Small waste facilities, owned and operated by or on behalf of a local council, in existence before April 2008 and receiving less than 5000 tonnes of solid waste per annum, have been exempt from licensing.

Small waste facilities typically deal with amenity issues including capacity issues, odours, flies, vermin, hazardous materials and wind-blown litter. Other potential environmental impacts from these facilities that may not be as obvious (such as groundwater contamination and greenhouse gas emissions).

Operators (of small waste facilities can improve waste management practices by adding engineered environmental controls, closing small landfills and establishing site-specific transfer stations/drop-off facilities which are serviced by regional waste facilities.

The NSW Government's Waste and Sustainable Materials Strategy 2041, sets ambitious targets to increase resource recovery, reduce the climate change related impacts of landfills, and reduce the amount of wastes landfilled, littered and illegally dumped across NSW. The implementation of this strategy will require effort from everyone, including regional councils and operators of small waste facilities, to improve community safety and amenity and overall supervision and operation at small waste facilities.

The Environment Risk Assessment and Mitigation Package (E-RAMP) can support council consider existing and future risks and make decisions to invest capital and operational expenditure in implementing improvements through the generation of risk analysis reports. The reports are only accessible to the officer inputting the data.

E-RAMP is designed to support the other guidance documents provided by the NSW EPA:

- Environmental guidelines: Solid waste landfills – Second edition (EPA 2016) – This document is intended as guidance for larger landfills (those accepting over 5000 tonnes of waste per annum). *(At the time of publication, the guidelines were in the process of being reviewed).*

- Handbook for design and operation of rural and regional transfer stations (DEC 2006) – This handbook aids operators intending to develop resource recovery and/or waste transfer facilities in rural and regional areas in NSW, drawing on the successful experiences of other operators.

The EPA examined several approaches to providing direction to operators of small waste facilities, particularly small landfills. After consultation with operators of small waste facilities, voluntary regional waste groups and EPA regional officers, it was decided a risk management approach offered several distinct advantages:

- it would be site-specific.
- the risks identified could be prioritised and dealt with within the operator's budget.
- it could be part of the process of deciding whether to extend an existing one or convert operations from a landfill to a transfer station.
- it could support 'due diligence' procedures.

In developing the E-RAMP tool, the EPA considered:

- the risk assessment process was based on information from differing circumstances across NSW, such as waste facility types, landfill operations, rainfall, average wind speed/direction and surrounding land use, which could then be applied anywhere in the state.
- the required information inputs could be sourced directly by the operator and/or be readily available from other reputable sources.

- operators could perform the risk assessment without the need to engage specialist waste, environmental or risk management expertise.
- the assessment process could be done in a timely and cost-effective manner while providing meaningful information.

E-RAMP is available on the EPA website for access by all waste facility operators in NSW and while the EPA supports the package, use of the package is not mandatory. The package comprises a Microsoft Excel-based risk assessment and this supporting manual. The package has been updated in response to changes in EPA branding, debugging and inclusion the risk of greenhouse gas.

Risk management process

E-RAMP follows the risk management process as detailed in AS ISO 31000:2018 (Standards Australia 2018). In summary, the key steps of the risk management process are as follows.

Communicate and consult

Communication and consultation engage internal and external stakeholders in the exchange of information. It is essential to communicate the objectives of the risk management process, and identify, analyse, evaluate and treat risks, and set the risk evaluation criteria.

Establish the context

An understanding of the context defines the basic parameters within which risks must be managed and sets the scope for the rest of the risk management process. Context includes the broad external environment in which the organisation operates ('external' context) and the factors that drive decisions or influence an organisation's ability to manage risks ('internal' context). This step also determines the objectives of the risk management process and the risk criteria to be assessed.

Identify risks

A well-structured, systematic process is used to identify potential risks. This step is critical as any risks not identified here may be excluded from future analysis. It involves identification of potential sources of risk as well as potential environmental impacts.

Analyse risks

The analysis of risk is the examination of the combination of the likelihood of an event occurring and the potential severity of the consequences. This process can employ one or several quantitative, semi-quantitative or qualitative methods to analyse risks.

Evaluate risks

The evaluation of risks concerns setting priorities for decisions about risk, based on a comparison between the risk analysis and the risk criteria. The outcome of this process is typically categorisation of risks into three groups: acceptable risks, tolerable risks (unacceptable risks that can be treated) and unacceptable risks.

Mitigate risks

The treatment of risks options identifies the risk treatment options available and assesses them in terms of the impact on the level of risk and cost-effectiveness. Risk management plans are also developed in this step, which schedule the risk treatment work(s).

Monitor and review

Site-specific factors may change over time, when new processes/procedures are implemented and/or as new information comes to light. Sites will require ongoing monitoring and changing factors may impact on the level of risk. A re-evaluation of risks through E-RAMP may lead to the development of updated risk analysis reports.

Context

There is a wide degree of operational and environmental variation between small waste facility sites in NSW. For example:

- The quantity of waste received at small landfill facilities can range up to 5000 tonnes per annum.
- The quantity of waste received at small transfer stations can range from less than 100 tonnes to 30,000 tonnes per annum.
- Precipitation at these facilities can range from less than 200 mm a year to over 2000 mm.
- The landscapes where facilities are located vary widely, from coastal floodplains to alpine ridgelines.
- Some facilities are extremely remote, while others are close to large population centres.
- Facilities may service a range of population numbers and include householders and local small businesses.
- The proximity to alternative landfill and transfer station facilities may range from a few kilometres to hundreds of kilometres.
- The level of management at facilities can be variable.

Regardless of the local variations, all small waste facilities play an important role in local waste management. In their absence, inappropriate management of waste can lead to widespread and potentially significant health impacts and harm to the surrounding environment.

Operators of small waste facilities can face considerable operational challenges. Operators have a statutory obligation to minimise risks while serving community needs and expectations. Often the management of small waste facilities occurs with limited budgets and resources alongside competing council priorities.

A risk management approach can focus budgets and resources to areas where they will achieve the greatest environmental outcomes. Risk management can also discover previously unidentified risks for a particular facility and support council decision-making to address risks based on best practice.

E-RAMP is designed to assist operators to assess the environmental risks of small waste facilities. Using information about the operation and management of the facility and the surrounding environment, a number of hypothetical mitigation measures can be examined to gauge how they will change the level of environmental risk.

The expected benefits of using E-RAMP are:

- reduction in the time and resources required to undertake a risk assessment.
- generation of environmental information which operators may not have previously accessed.
- provision of environmental risk information to assist operators to make management decisions.

Communication and consultation

A communication and consultation exercise was undertaken for the development of E-RAMP with a representative cross-section of stakeholders. Participant feedback was incorporated into the final version of E-RAMP in 2008. In 2014, E-RAMP was reviewed to remove bugs in the risk assessment calculations and again in 2023 to include greenhouse gas considerations.

Risk identification

In parallel with the communication and consultation, a list of potential environmental risks from small waste facilities was compiled. This process was supplemented by:

- a review of EPA records in relation to small waste facilities across NSW.
- information on public complaints to EPA's Environment Line.
- inspections of 49 small waste facilities across 38 local government areas.
- an examination of relevant EPA guidance documents: Environmental guidelines: Solid waste landfills Second edition (EPA 2016) and the Handbook for design and operation of rural and regional transfer stations (DEC 2006).

The potential sources of risk identified were related to:

- sensitivity of the surrounding environment.
- types and quantities of wastes received, stored and/or disposed at the premises
- presence or absence of management controls and measures to minimise the likelihood of emissions to the environment.

Appendix A contains identified sources of risk.

Risk analysis

For the purposes of the E-RAMP risk analysis, the potential risks associated with a small waste facility have been grouped into seven categories:

1. **Groundwater** – the potential risk to groundwater from landfill leachate and leaks/spills of hazardous substances.
2. **Surface water** – the potential risk to surface water from landfill leachate, leaks/spills of hazardous substances, sediments, saline and/or acidic soils.
3. **Air** – the potential risk to air quality from smoke, fine particulates (dust) and odours.
4. **Noise** – the potential risk from noise to neighbouring residences/land uses.
5. **Fire** – the potential risk of fire occurring at a premises and the potential risk that any such fire poses to the immediate surrounds.
6. **Amenity** – the potential risk to amenity from litter, smoke, dust, odours, vermin and general site operations.
7. **Conservation and heritage** – the potential risk to surrounding areas of high environmental and/or heritage value.
8. **Greenhouse gas** – the potential risk of the emission of greenhouse gasses (specifically methane) to the atmosphere.

E-RAMP requires site-specific information and information held by the operator of the facility. E-RAMP also draws upon sources of data contained in online NSW Government data bases and provides links to the relevant sources of data.

E-RAMP makes two main assumptions:

1. The operator of the small waste facility will not take any action to increase environmental risk at the premises, such as discontinuing groundwater monitoring, removing litter fences, etc. Increasing risk works against the intent of the risk management process.
2. The existing situation options and proposed mitigation options match (or closely match) the options presented in E-RAMP.

E-RAMP accommodates potential information gaps by providing an 'unknown' answer option to some questions. The E-RAMP default options may assume a conservative level of risk i.e. a risk level that is likely to be higher than the actual level of risk.

Due to the complexity of environmental interactions, a single source of risk may have differing likelihoods of impact/severities of impact on the surrounding environment. Multiple sources of risk can also combine to increase the likelihood and/or severity of impacts on the surrounding environment. E-RAMP has attempted to capture as many of these interactions as possible, although there may be some situations where these differences/interactions have not been accounted for.

To validate the E-RAMP process, several scenarios were examined using information obtained from site inspections. The results were checked for consistency (for similar situations), contrast (for vastly different situations), sensitivity (for slightly different situations) and sensibility e.g. larger facilities having higher risk than smaller facilities in the same environmental settings with the same management/controls.

Evaluation of risks

Five risk categories have been established as part of the evaluation of risks associated with small waste facilities.

Very high	High likelihood of an event occurring and the significant environmental consequences of this. Very high risks should be treated as soon as possible as a priority and may include closure of the facility. Frequent monitoring and review after treatment is necessary to ensure the level of risk is reduced to a level where it is either acceptable or where further treatment can be scheduled once the initial very high risk is alleviated.
High	High likelihood of an event occurring and/or the significant environmental consequences of this. High risks should have the highest priority in scheduled risk treatment plans. Frequent monitoring and review before and after treatment should be undertaken to ensure the risk treatment is effective.
Medium	Moderate likelihood of an event occurring and the environmental consequences of this. Medium risks should be prioritised for treatment and regularly monitored and reviewed to ensure changing circumstances do not also change the level of risk. Medium risks are only acceptable in situations where there are no reasonable or feasible risk mitigation options available. Stringent monitoring programs should identify potential impacts, and procedures established to respond to situations where the monitoring identifies a potential issue.
Low	Low likelihood of an event occurring and/or the environmental consequences of this. Low risks can be accepted, subject to justification in terms of the cost-effectiveness of treatment options and ongoing monitoring and review. Low risks should be prioritised for treatment and monitored and reviewed to ensure changing circumstances do not also change the level of risk.
Very low	Low likelihood of an event occurring and the insignificant environmental consequences if it did. Very low risks can be accepted, contingent upon regular monitoring and review to ensure changing circumstances do not also change the level of risk.

Mitigation treatment

E-RAMP can present potential mitigation options based on data collected in the communication and consultation and risk identification stages to treat identified potential risks. The focus of mitigation options is primarily on reducing the likelihood and/or severity of an event, but can include avoiding risks, for example, closing a landfill where uncontrolled fires are an ongoing problem. Mitigation is a proactive approach to identified potential risks while risk treatment is reactive and can be undertaken after an event.

By utilising hypothetical mitigation options, the results on the overall risk can be observed and the operator can then formulate a risk treatment that outlines accountabilities, responsibilities, resource/budget allocations and time frames for implementation. This need not be a lengthy document and can be attached as an addendum to the risk report from E-RAMP.

Appendix C contains examples of actions that have been undertaken by councils to mitigate risk.

Monitoring and review

Monitoring and review is a crucial component of the overall risk management process. It is particularly important for environmental risks because of some of their unique characteristics including:

- the complexity of the environment and natural variability.
- a general lack of data, or limited data sets, and the need to make assumptions.
- the long timespans in which environmental changes may emerge due to natural delays and a lack of clear or direct links between causes and effects.

The E-RAMP assessment should be repeated:

- after an incident occurs that directly affects the level of environmental risk assessed as part of the previous assessment.
- upon the availability of new or updated information directly relevant to the previous risk assessment.
- after risk mitigation measures are employed at the small waste facility. This will allow a review of mitigation measures to be undertaken.
- after a period of 12 months from the previous assessment.

Re-assessment requires a new copy of the E-RAMP tool to consider changes to the surrounding environment, such as residential encroachment, newly installed groundwater bores, new national parks, etc.

Documentation relating to the re-assessment process should be filed to demonstrate that the monitoring and review step in the risk management process is being undertaken.

Appendix A: Sources of risk

It is highly unlikely that all the identified sources of risk would apply to one particular site.

Waste facilities – Common sources of risk	
Operational	**Physical**
Area (size) of the facility	Annual rainfall/evaporation
Quantity of waste received	Prevailing winds
Quantity of segregated wastes stored	Surrounding land use
Types of waste received (incl. liquid and special)	Distance to nearest resident
Bunding/containment of stored wastes	Distance to nearest major centre
Supervision/waste screening (incl. fees charged)	Distance to nearest watercourse
Security of premises	Site hydrology
Hours of operation	Site slope/morphology
Size of disturbed areas/sediment management	Soil type/characteristics/chemistry
Litter control	Depth to groundwater
Signage	Depth to bedrock
Controlled burning	Geology
Access/drop-off area construction	Proximity to sensitive areas, e.g. bushfire-prone land
Dust controls	Visibility of site
Plant/equipment used and frequency	Proximity to threatened species
Pest management	Proximity to endangered ecological communities
Fire controls/prevention	Proximity to Aboriginal cultural heritage
Absence of documented procedures/plans	Proximity to Sydney Metropolitan Area
On-site segregation/recycling	Proximity to Extended Regulated Area
Household waste/recyclable collection service	
Hazardous/chemical waste collection service	
Staff training	
Household green waste/FOGO collection	
Incident	**Information**
Uncontrolled fires	Community education programs
Disposal of unlawful/hazardous waste	Regulation/enforcement activities
Public complaints	Absence of monitoring
Leachate contamination of waters	Lack of environmental information
Landfill gas generation	Data reliability

Small transfer station-specific sources of risk

Type of transfer station	Construction/completion of transfer station
Quantity of waste for transfer stored	Previous land use (i.e. former landfill)
Frequency of removal	

Small landfill-specific sources of risk

Amount of waste in place	Covering (frequency and materials)
Type of landfill (trench, above ground, etc.)	Construction/completion of cells/pits/trenches
Compaction (frequency and method)	Post-closure land use
Number and area of active landfill areas	

Appendix B: Using E-RAMP

Introduction

E-RAMP is a Microsoft Excel-based program developed to assess the risks posed by small waste facilities and suggest potential mitigation measures to treat identified risks. This version has been developed in consultation with small waste facility operators and EPA regional and technical officers. Each facility will require a separate risk assessment to be created and saved under the name of the facility.

The primary objective of E-RAMP is to make risk assessments of small waste facilities accessible to operators in regional and rural areas of NSW and condense the length of time taken to carry out a risk assessment (as outlined in AS ISO 31000:2018).

The EPA will not have access to the inputs into the tool or the final report. The file is saved on the operators database and is only accessible to the operator undertaking the assessment. Should the operator wish to share the report with the EPA or other stakeholders, the report can be saved to a local directory and sent as a pdf.

Key considerations considered during the development:

- The risk assessment process draws on information relevant across all of NSW and be applied to any site-specific location within the state. The assessment considers the significant variation between waste facilities across NSW in terms of type, size, wastes received, climate, environmental sensitivities.
- The information required to undertake the risk assessment is either readily available to small waste facility operators or easily accessible from other sources.
- The program should be easy to use without the need to engage specialist waste, environmental or risk management expertise.

E-RAMP has incorporated external factors and links into the tool to avoid the need to consider volumes of reference material prior to commencing the risk assessment process. There are links to external online information resources, current at the time of production. If any link in E-RAMP fails to connect with the desired source, please contact the person nominated on page iv of this document.

The external links will open in the assigned internet browser. E-RAMP will remain open in Excel. The data sought will have to be manually populated back into the Excel tool.

The online information resources include:

- **Spatial Information Exchange** administered by the NSW Spatial Services – provides fast and easy access to high resolution satellite imagery across the whole of NSW as well as 1:100,000 topographic maps, cadastral (land tenure) and address information that can be searched against. Use of this resource may require the download of a plug-in, which can be done automatically from the Spatial Information Exchange website at https://maps.six.nsw.gov.au/.
- **The Central Resource for Sharing and Enabling Environmental Data** (SEED) in NSW – a web-based portal where the community and government come to access, interrogate, contribute, and share NSW environmental data.
- **Bureau of Meteorology** website administered by the Bureau of Meteorology – includes immediate and historic climate conditions for local areas.

It is recommended that E-RAMP users familiarise themselves with the *Spatial Information Exchange* (SEED) prior to using E-RAMP to ensure the most efficient use of their time in undertaking the assessment.

Getting started

Screen resolution

E-RAMP has been designed to operate on a widescreen, high-resolution monitor at a minimum screen resolution of 1920 x 1080 pixels. If your monitor is operating at a lower resolution, it may be necessary to adjust it prior to using E-RAMP. This process may require your system administrator's assistance. It is possible to adjust the screen resolution by the following steps (this may be slightly different depending on your version of Microsoft Windows):

1. Open the Windows Start Menu and type 'screen resolution' into the search box at the bottom of the panel. Choose 'Adjust screen resolution' from the search results.

2. In the resulting dialogue box, illustrated below, ensure that the value for 'Resolution' is set to a minimum of 1920 x 1080 pixels. Use the pull-down slider to increase the resolution if necessary.
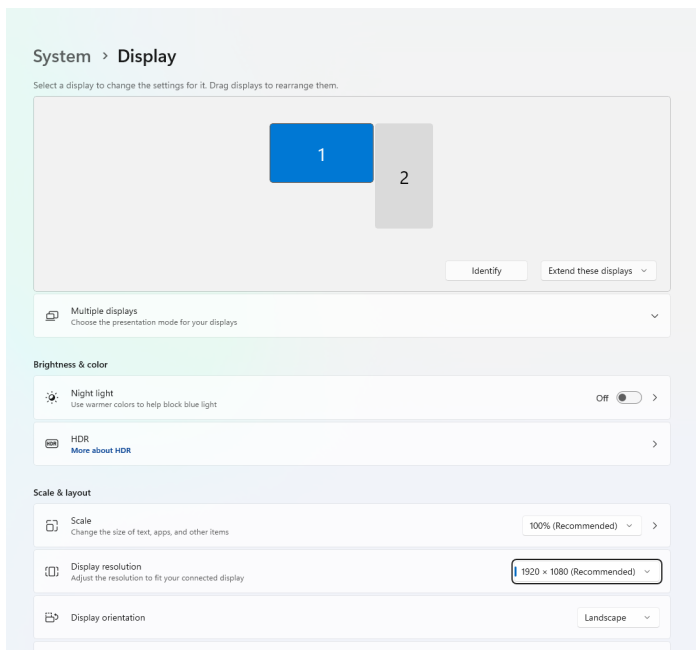
Adjusting macro security

The next step is to configure Excel's security settings to enable it to run macros. E-RAMP contains numerous macros to assist with the user input and risk analysis. If the macros in E-RAMP are disabled, the program will not function. Again, you may require the assistance of your system administrator with this step depending on the operating system and version of Excel.

Opening E-RAMP

When you initially open E-RAMP you may see a warning that macros have been disabled. Choose the option to enable macros. This will allow E-RAMP to function and generate a report.

Using E-RAMP

E-RAMP has been designed for ease of use via a 'Q&A' format. Almost all the responses required are via selection from lists, check boxes and yes/no buttons. The only keyboard input required in E-RAMP is on the 'Premises' page where the name of the operator of the facility, the name of the facility itself and the location of the facility are required to be input.

The possible responses are designed to closely reflect the most common situations encountered during E-RAMP development. If a situation at your particular waste facility does not appear on the list of possible answers, just select the option that most closely describes the situation.

Alternatively, if you feel your situation is unique, please contact the EPA for further guidance. Below is a sample E-RAMP screen and a key to the various elements.

1. **Progress bar** – shows the user their progress in the assessment process.
2. **Page heading** – each page of E-RAMP contains a related group of questions.
3. **Comment marker** – hover over these to reveal additional information.
4. **Comment** – pops up to provide additional information to assist the user.
5. **Drop-down list** – click on the down arrow to reveal available responses.
6. **Hyperlink** – links to an external data source to assist in answering the question.
7. **Input question** – details the information sought for this part of the assessment.
8. **Check boxes** – these and the Yes/No buttons elsewhere operate in a similar way
9. **Navigation buttons** – these guide the user through the E-RAMP process.
10. **Save & Close button** – saves progress and closes the input session.

Structure of E-RAMP

The E-RAMP process contains three main parts.

Existing facility information

This initial part of E-RAMP collects information about:

- the premises itself (name, type, size, location, etc.)
- the surrounding environment (local meteorology, premises soil types, surrounding land use, topography, proximity to environmentally significant areas, etc.)
- available environmental information for the premises, including any monitoring undertaken
- operational management practices and control measures employed at the premises
- community education.

At the completion of this step, you will be prompted to review the information or proceed to the mitigation options. It is important to note that once the 'proceed' option is selected, the information provided is locked in and cannot be changed for the assessment being undertaken. The utilisation of E-RAMP is unlimited, and you can commence a new assessment if required, if you save each

version under a new file name. After 'proceed' is selected, the risk profile for the premises, based on the information provided, will be displayed.

Potential mitigation options

IN the mitigation section you will apply hypothetical mitigation measures to your existing situation to assess the difference made to the level of risk. These screens look very similar to the existing premises data input screens with some differences to the navigation button:

- 'Reset' button – This button will return the mitigation options for the page to the existing situation (i.e. the status quo). The 'Reset' button is very useful when comparing many different scenarios of hypothetical control measures as you can always return to the existing situation and level of risk.
- 'Risk Profile' button – This button will take you to the risk profile so you can view what effect the hypothetical mitigation measures will have on the overall risk profile of the premises.

The mitigation section asks questions in relation to factors that can be changed at a facility. For example, questions regarding depth to bedrock will not appear in the mitigation section as it is assumed that this will not change (at least significantly) over the life of the facility but questions regarding options like fencing of the premises will appear in the mitigation section as this is within the power of the operator to change.

Appendix C contains examples of practices that could be considered to mitigate risk at small landfills.

Risk analysis and risk profile

The risk analysis part of E-RAMP operates simultaneously with the existing premises data and potential mitigation options. Each response is fed into the risk analysis model and used in the assessment of the overall level of risk. The calculations occur in the background of the E-RAMP tool.

The risk profile is the main output of E-RAMP. This graphical display allows the user to visually see the level of risk the assessed facility poses and the effect that the hypothetical mitigation measures will have on this existing level of risk.

Saving E-RAMP

You can save your data at any time by selecting the 'Save & Close' button that is located on each data input page. The file will be automatically renamed when saved. If E-RAMP is saved from a data input page, the format used for the file name is:

'E-RAMP [name of facility] (in progress) [today's date]'.

For example, when using E-RAMP to assess the environmental risks at the Smallville Tip on 27 August 2023, the file will be saved as 'E-RAMP Smallville Tip (in progress) 27 August 2023'.

On the Risk Profile page, the 'Finalise, Save & Close' button will finalise the E-RAMP assessment. The name of the file is slightly different:

'E-RAMP [name of facility] (final) [today's date]'.

This naming convention is important to ensure that the history of the risk management process can be accurately documented and that the most current version of the assessment for a particular facility is being used to make management decisions.

Once the E-RAMP process is complete, you can print a report. The report compiles all the information used for the risk assessment, along with the risk profile. This report can then form part of the documented record of the risk management process for the premises.

Appendix C: Observed practices to minimise risk

Introduction

A range of operational practices were observed during the design phase of E-RAMP to be more effective in minimising environmental risk at small waste facilities. This list is not an exhaustive inventory of risk minimisation practices, and not all the practices listed may be applicable, suitable, or feasible for all small waste facilities. Sites that implemented some of the practices below reported a significant reduction in the frequency of complaints, environmental incidents, and regulatory interventions.

Strategic management

- Consolidation of small landfill sites, particularly those located in areas posing high environmental risk.
- Detailed site selection process for new waste facilities, using exclusion mapping (or similar process).
- Detailed planning and design to minimise the site footprint while maintaining maximum functionality.
- Documented and implemented waste management procedures.
- Training of operators of waste facilities, customised to the needs for the particular site(s).
- A considered landfill closure management plan considering future use of the area or surrounding land uses.

Environmental information and monitoring

- Detailed environmental investigation of site(s) for proposed new waste facilities, or existing sites where potential environmental sensitivities exist.
- Environmental monitoring of potential impacts on receiving environment.
- Undertaking a groundwater investigation on sites in high groundwater vulnerability areas to confirm potential or actual groundwater pollution. If there is no evidence of groundwater pollution then further investigation is not required.
- EnviroLine must be notified immediately If there is evidence of pollution https://www.epa.nsw.gov.au/about-us/contact-us/environmentline.

Community information, education, and awareness

- Clear, communicative, and uniform signage at waste facility sites.
- Providing information to the community through several means (media, internet, council newsletter, directly by operating staff, etc).
- Targeting community information where/when required (e.g. penalties for unlawful dumping of waste).

Operational

- Minimising the quantity of waste stored on site at any one time.
- Minimising the time waste is stored on site.
- The storage of liquid/hazardous wastes in impermeable bunds.
- The exclusion of liquid wastes from landfill disposal.

- Restricting the volumes of waste requiring special management (e.g. asbestos, clinical waste, animal carcasses, biosolids and contaminated soil) where viable alternatives exist.
- Restricting the time the waste facility is open to specified hours on specified days, supported by site supervision with an education program to inform the local community of the facility's operating hours and the reasons for limiting access.
- Effectively securing the waste facility outside of the restricted opening hours through fencing and securing access points and consider security cameras.
- Supervision by suitably trained operator when the facility is open to the public.
- Minimising the size of 'dirty' water catchments (disturbed and waste handling/disposal areas).
- Preventing or minimising surface run-on into waste cells/landfill or where waste is stored.
- Preventing or minimising surface run-off from cells to receiving environments.
- Minimising areas and stockpiles of disturbed soil.
- Utilising litter fences/cages and regularly scheduled litter clean-ups.
- Providing community hazardous waste collection/drop-off service.
- Elimination of controlled burning.
- A documented and implemented fire response plan prepared in consultation with Fire & Rescue NSW or the Rural Fire Service.
- The preparation and updating of a site filling plan, detailing the capacity of the cells, sequence of filling and rehabilitation of the disposal cells.
- Regularly scheduled covering of landfilled waste.
- Progressive capping with virgin excavated natural material (VENM) or excavated natural material (ENM) and rehabilitation of completed landfill areas. Final capping should form a low permeability barrier and separate the waste from the surface layer to minimise water infiltration. The area should be contoured to minimise water entering the landfill area.
- Active and consistent investigation and enforcement of identified waste related offences by Appropriate Regulatory Authority.

Further reading

DEC 2006, *Handbook for design and operation of rural and regional transfer stations*, Department of Environment and Conservation NSW, Sydney.

Environment Agency 2000, *Licensed waste management facility site inspection methodology and consistent scoring guidance*, UK Environment Agency, Bristol, UK.

Environment Agency 2004, *Guidance on assessment of risks from landfill sites*, UK Environment Agency, Bristol, UK.

EPA 1996, *Environmental guidelines: Solid waste landfills*, NSW Environment Protection Authority, Sydney.

EPA 2002, *Industry sector: Rural waste landfill facilities – Compliance performance report*, Environment Protection Authority, Sydney.

Golder Associates (NZ) Ltd 2002, *Risk assessment for small closed landfills*, Ministry for the Environment, Christchurch, NZ.

NSW Government 2011, *NSW 2021: A plan to make NSW number one*, NSW Department of Premier and Cabinet, Sydney.

Standards Australia 2004, *AS/NZS 4360:2004: Risk management*, SAI Global, Sydney.

Standards Australia 2006, *HB 203:2006: Environmental risk management – Principles and Process*, SAI Global, Sydney.

United States Environment Protection Agency 2005, *Introduction to municipal solid waste disposal facility criteria (USEPA)*, Office of Solid Waste and Emergency Response, United States Environment Protection Agency, Washington DC, USA.