Environment Protection Authority

# Solid waste landfills – compliance audit program

Summary report

Published by:
**NSW Environment Protection Authority**
4 Parramatta Square
12 Darcy Street, Parramatta NSW 2150
Locked Bag 5022, Parramatta NSW 2124

Phone: +61 2 9995 5000 (switchboard)
Phone: 131 555 (NSW only – environment information and publications requests)
Fax: +61 2 9995 5999
TTY users: phone 133 677, then ask
for 131 555
Speak and listen users:
phone 1300 555 727, then ask for 131 555

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Website: www.epa.nsw.gov.au

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## Acronyms used in this report

| | |
|---|---|
| EPA | New South Wales Environment Protection Authority |
| EPL | Environment Protection Licence |
| NSW | New South Wales |
| PIRMP | Pollution Incident Response Management Plan |
| POEO Act | *Protection of the Environment Operations Act 1997* |
| TSS | Total suspended solids |
| VENM | Virgin excavated natural material |

# Executive summary

The New South Wales Environment Protection Authority (EPA) has completed a compliance audit program on solid waste landfills in New South Wales (NSW). These landfills receive and dispose of general solid waste (putrescible and non-putrescible), asbestos waste, waste tyres, and clinical and related waste. The EPA audited 21 (15%) of the approximately 140 landfills in NSW that hold an Environment Protection Licence (licence). Site audit inspections were undertaken during 2018 and 2019. This report summarises the audit findings.

The audits focused on assessing compliance with limits, operating, monitoring and recording, and some reporting and general conditions on licences issued to these landfills.

The objective of the audit program was to assess licensees' levels of compliance with the requirements of their licences, and to improve their environmental performance.

Although licensees complied with over 50% of the audited requirements, several non-compliances were observed that had considerable environmental significance, including high to moderate risks. Whereas the high to moderate risk non-compliances require immediate attention by licensees, all non-compliances identified must be addressed by licensees. The audits present an opportunity for improvement by landfill operators.

The findings of the audits demonstrate that landfills could improve their compliance and environmental performance by ensuring that:

- wastes are covered and landfilling areas are capped as required in a timely manner
- only approved types and quantities of wastes are accepted and disposed of
- landfill cells and leachate barrier and collection systems are designed, constructed and operated in a manner that prevents groundwater pollution
- collected leachate is stored in appropriately sized dams and tanks and disposed of so as not to cause environmental harm
- stormwater management is implemented to minimise erosion and reduce the sediment load (suspended solids) of stormwater discharged from the site
- landfill gas is managed in a way that minimises its emission to the atmosphere and prevents it intruding through sub-surface strata and soil vapour into nearby buildings
- water quality is monitored in accordance with applicable standards and licence conditions
- landfills are operated in a way that minimises amenity issues such as odour, dust, noise, litter and fire
- the sampling and analytical methods and procedures used to monitor and analyse leachate, stormwater, landfill gas and dust emissions are undertaken in accordance with licence requirements
- hazardous materials and waste are stored and handled in a way that minimises fire risks and risks of pollution of soils, surface water and ground water.

This report also contains examples of good practices observed during the audit inspections, such as:

- landfill cells adequately bunded and bunds inspected and maintained regularly to prevent uncontaminated stormwater from draining into landfilled areas
- water from sedimentation ponds regularly analysed for pollutants and used for dust suppression on site
- monitoring points adequately signposted and procedures in place for regular inspection
- regular use of road-sweeper on sealed roads and water carts on unsealed roads to minimise dust emission

- active tipping face kept small, especially during windy conditions
- wheel washes installed at exit roads to remove mud and litter from vehicles
- appropriate stock- and wildlife-proof mesh fences installed around landfilling areas and leachate and sedimentation ponds to keep out stock, and native and feral animals
- stockpiles kept small and located away from bush areas and separated to reduce the spread of fire
- fire sprinkling systems fitted and operational at recycling plant storage areas
- cameras and viewing platforms installed at weighbridge to allow weighbridge staff to screen waste loads and trucks
- asbestos waste disposed of in designated areas, which were recorded in landfilling plans.

The findings of the audits and examples of good practice presented in this summary report provide valuable information to help all operators of solid waste landfills – including those who were not audited – to improve their compliance and environmental performance.

Figure 1 Waste being compacted at a landfill. Photo: Karin Schianetz/EPA

# 1. Introduction

The EPA has completed a compliance audit program on solid waste landfills. This report presents the program's findings.

## 1.1. Compliance audit programs

The New South Wales Environment Protection Authority (EPA) regularly undertakes compliance audit programs targeting specific industries, activities or legislative requirements. The aim is to improve industry's compliance and environmental performance and the EPA's regulation. Under section 9 of the Protection of the Environment Administration Act 1991, the EPA

> is required to develop a comprehensive scheme of environmental audits with respect to industry, commerce and public authorities.

The EPA fulfils this statutory obligation by planning, developing and implementing compliance audit programs.

The compliance audit programs focus on priority environmental issues. Targeted sectors and activities are chosen by:

- reviewing available licence and enforcement data
- consulting with EPA operational areas
- assessing major environmental and community concerns alongside the EPA's corporate objectives and strategies.

Solid waste landfills were selected for this compliance audit program.

For more information on compliance auditing, including reports on previous programs, see the EPA website.

## 1.2. Solid waste landfills

### Regulation of solid waste landfills

The *Protection of the Environment Operations Act 1997* (POEO Act) allocates responsibilities for pollution prevention and control to the EPA, local councils and other public authorities. The EPA is the appropriate regulatory authority for:

- regulating activities listed in schedule 1 of the POEO Act
- ensuring compliance with licences
- regulating activities carried out by the state or a public authority.

Sites that undertake scheduled activities and meet the licensing threshold in the POEO Act are licensed and regulated by the EPA.

**Solid waste landfill disposal** is defined in schedule 1 of the POEO Act as:

the application to land of waste received from off site, including (but not limited to) application by any of the following methods:

a. spraying, spreading or depositing on the land

b. ploughing, injecting or mixing into the land

c. filling, raising, reclaiming or contouring the land.

The licensing threshold for landfills depends on waste origin, site location, annual amount of waste received, and types of wastes landfilled.

An Environment Protection Licence (licence) regulates the whole waste disposal process and associated activities, such as: waste receival and storage; landfill cell construction, operation and closure; leachate and surface water management; site security; fire prevention; training; control of litter, vermin, pests and noxious weeds; and monitoring of landfill gas, groundwater, surface water and leachate.

The EPA licenses 140 solid waste landfills (as of January 2020) across New South Wales (NSW), with varying capacities, waste limits and permitted wastes. Most landfills are owned and operated by local councils; the rest are owned and operated by the private sector.

For more details about the legislative context, refer to the document *EPA Environmental Guidelines: Solid waste landfills* (NSW EPA 2016).

## Why did we select landfills for this compliance audit program?

Landfills have been identified as being a priority sector for a compliance audit program because of associated environmental risks, elevated compliance risks and a high number of non-compliances recorded within the sector.

The main environmental risks associated with landfilling activities are surface and groundwater pollution, soil contamination and air emissions.

The main sources of surface and groundwater pollution from landfilling activities are inadequately contained or treated leachate and stormwater.

Air emissions are mainly caused by landfill or stockpile fires and the escape of landfill gas and dust.

Soil contamination can be the result of inappropriate storage and disposal of waste or hazardous materials, such as fuels, waste oils and asbestos.

## Waste disposal and waste classification in NSW

The best way of dealing with waste, both economically and environmentally, is to avoid creating it. For effective waste management waste minimisation, re-use, recycle, and energy recovery are more sustainable than conventional landfill technique. Landfills are considered an option for waste disposal only where it is neither technically feasible nor economically viable at the present time to avoid, re-use, recycle, or energy from waste. In NSW, over 37% of the total[1] waste generated in the state is landfilled (based on figures for 2014–15) (NSW EPA 2019), this equates to 6.2 million tonnes per year.

A landfill is an engineered, in-ground facility for the safe and secure disposal of society's wastes to land. In NSW, new solid waste landfills must be designed and operated in accordance with a series of **minimum standards** specified in *EPA Environmental Guidelines: Solid waste landfills* (NSW EPA 2016). The EPA uses these guidelines to assess applications for new or varied landfill licences and to assess issues that arise during the operation and post-closure periods of landfills. The minimum standards in these guidelines apply to both general solid waste and restricted solid waste landfills.

**General solid waste landfills** are licensed to dispose of putrescible and/or non-putrescible general solid waste. Putrescible solid waste includes household waste that contains putrescible organics, waste from litter bins collected by or on behalf of local councils, manure, food or animal

[1] **Total waste** includes municipal solid waste, commercial and industrial waste, and construction and building waste.

waste. Non-putrescible general solid waste includes glass, plastic, rubber, plasterboard, bricks, concrete, metal, paper and cardboard, and garden and wood waste.

All waste should be classified prior to disposal to ensure that the receiving facility can lawfully accept it In NSW waste is classified in accordance with the EPA Waste Classification Guideline. It is unlawful to dispose of waste classified as hazardous waste in NSW. There are some higher engineering standards for **restricted solid waste landfills**, recognising the higher environmental risks associated with these wastes. The chemical assessment process is based around the waste's potential to release chemical contaminants into the environment through contact with liquids, which leads to the production of leachates. Wastes that exceed general and restricted solid waste specific contaminant or leachable concentration thresholds, but are below a hazardous threshold, are classified as restricted wastes. Wastes that exceed the general and restricted solid waste specific contaminant or leachable concentration thresholds must be classified as **hazardous wastes** and cannot be disposed of in any NSW landfill. For further details with respect to waste classification in NSW refer to *NSW EPA Waste Classification Guidelines – Part 1: Classifying waste* (NSW EPA 2014).

## Landfill operations in NSW

Generally, landfills are equipped with one or more weighbridge, where incoming waste collection vehicles are weighed on arrival and landfill personnel inspect loads to ensure that only approved wastes are accepted and disposed of at the site. Landfills that don't have a weighbridge are required to record incoming loads and calculate their weight by estimation. Waste loads are then sorted and/or transported and deposited at the active tipping face, where the waste is spread and compacted by landfill machinery in a designated area (landfill cell). Waste compaction is critical to conserve landfill space. Typically, in the tipping face, the compacted waste is covered daily with soil or virgin excavated natural material (VENM) or alternative material to control fire risks, odour emission, windblown litter and vermin. Special wastes, such as asbestos, clinical waste and odorous waste, have additional covering requirements.

Figure 2 A landfill weighbridge at a waste facility. Photo: Christopher Burt/EPA

Figure 3 An active tipping face. Photo: Nicole Wilmot/EPA

Figure 4 Covering of waste with virgin excavated natural material.
Photo: Karin Schianetz/EPA

## Leachate

All new landfills in Australia (that is, those built after 1997) must have a leachate barrier system to contain leachate and prevent contamination of surface water and groundwater over the life of the landfill, unless the permeability of the underlying geology provides an impermeable substrate. Leachate is generated when waste comes into contact with rainwater or surface water through precipitation and percolation. Most modern landfills have compacted clay liners and/or geosynthetic clay liners installed, unless the permeability of the sub-base is low enough to contain all leachate. The leachate collection system consists of gravel drainage layers, collection pipework and a leachate extraction and level control system. Leachate above a specified level in the landfill cell is pumped or flows into leachate storage dams or tanks: it may be treated there or disposed of to a licensed treatment facility. The most-used methods for treating leachate are evaporation, irrigation of landfilled areas or reinjection back into the landfill cell. Off-site discharge of leachate into waters is generally not permitted, because leachate invariably contains a wide range of pollutants that potentially pose a risk to human health and the environment.

Figure 5 A leachate collection/pond with evaporator. Photo: Karin Schianetz/EPA

## Landfill gas

Landfill gas emitted to air or migrating through the ground is a health and environmental risk. Landfill gas comprises primarily methane and carbon dioxide together with other organic components, which can be odorous and/or harmful to health. Methane is flammable and can be explosive if it accumulates in confined spaces. Methane is also a strong greenhouse gas. Degradation of putrescible waste in landfills generate methane gas emissions, that therefore need to be minimised by appropriate collection, extraction and treatment methods. The various treatment options involve oxidising the methane and destroying the non-methane organic components. The most common treatment method in NSW is a landfill gas flare, as shown in Figure 6. In NSW landfill gas is also being used to generate energy at landfills.

Figure 6 A landfill gas flare. Photo: Karin Schianetz/EPA

## Capping and revegetation

Completed landfill cells are capped and revegetated as soon as practicable after the final delivery of waste to the cell. The final capping must reduce rainwater infiltration into the waste and thus minimise the generation of leachate; stabilise the surface; reduce suspended sediment and contaminated runoff; minimise the escape of untreated landfill gas; and minimise odour emissions, dust, litter, vermin and the risk of fire. The final capping must also prepare the site for its future use.

Figure 7 A capped landfill cell with irrigation. Photo: Karin Schianetz/EPA

## Sediment control

Landfill operators must also implement controls to minimise erosion and reduce the sediment load of stormwater discharged from the site. All sediment-laden stormwater runoff should pass through appropriate sediment control structures. Sediment controls include vegetative buffers, silt fences, fibre rolls, turbidity or silt curtains, and sediment basins. Stormwater runoff must be prevented from running onto the landfill, waste storage areas or capped cells by effective containment and diversion structures.

Figure 8 A sediment dam. Photo: Karin Schianetz/EPA

### Monitoring

Landfill operators must also undertake comprehensive monitoring to characterise the quality and quantity of wastewater (leachate and stormwater) generated on site, and also monitor landfill gas, dust and noise emissions. The monitoring program must ensure that:

- any pollution of off-site surface water and groundwater is detected
- appropriate notification, investigation and remedial procedures are followed when monitoring indicates that pollution may have occurred
- appropriate sampling and analysis methods are used in accordance with recognised guidelines and standards, including *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (NSW DEC 2004)
- any emissions of untreated landfill gas through the cover or capping material and fugitive emissions from any gas extraction system are detected
- landfill gas is not migrating off-site via the subsurface
- landfill gas is not accumulating at dangerous levels in enclosed spaces on or near the landfill
- emission of nuisance dust and other particulate matter beyond the landfill boundaries is minimised
- noise generated by activities at the site stays within permitted limits.

Figure 9 A groundwater monitoring bore. Photo: Karin Schianetz/EPA


For more details about landfill management and the minimum standards for design and construction techniques, effective site operations, and monitoring and reporting protocols, refer to *NSW EPA Environmental Guidelines: Solid waste landfills* (NSW EPA 2016).

## 1.3. Landfill compliance audit program

The objectives of the landfill compliance audit program were to:

- assess each licensee's compliance with the audit criteria
- improve licensee's awareness and understanding of environmental and compliance issues.

## What are compliance audits?

A compliance audit is an objective assessment of an auditee's activities to determine whether they comply with legal or regulatory requirements.

An audit is defined in the International Standard ISO 19011:2018 as a systematic, independent and documented process for obtaining objective evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled.

The criteria used for EPA compliance audits are generally the legal and regulatory requirements that the EPA administers, and the audits are undertaken in accordance with the procedures and protocols outlined in the EPA's *Compliance Audit Handbook* (NSW EPA 2017). The handbook can be accessed on the EPA website.

Audit findings are generated based on the evidence obtained, which includes information from EPA files, information supplied by site representatives, and observations made during audit inspections.

When an audit is completed, the findings are presented to the licensee in an individual compliance audit report. These individual reports are publicly available on the EPA's public register, which can be accessed on the EPA website.

## Which activities were audited? (Audit scope)

Although other activities, such as waste composting, waste recycling and extractive activities are licensed at some sites audited, the audits examined only landfilling and waste storage activities.

Activities audited:

- receival, storage, treatment, disposal and covering of waste
- management of leachate, groundwater and surface water, including treatment and monitoring
- dust, litter, odour, fire, pest and vermin control
- training and competency
- monitoring and recording of data and information as per the licence conditions
- maintenance and operation of plant and equipment
- preparing, keeping, testing and implementing a Pollution Incident Response Management Plan (PIRMP).

Activities not audited:

- management of noise
- load-based licensing requirements
- annual return requirements
- financial assurance requirements.

## Which requirements were assessed? (Audit criteria)

The requirements (audit criteria) that were assessed against the audit evidence were:

- conditions attached to the licence within the audit scope
- the legislative requirements for Pollution Incident Response Management Plans (PIRMPs) under chapter 5, part 5.7A of the POEO Act and chapter 7, part 3A of the POEO (General) Regulation
- the requirements of section 66(6) of the POEO Act relating to publishing of pollution monitoring data.

## How are the non-compliances assessed?

The EPA conducts a risk assessment of non-compliances as part of the audit process to identify the relative significance of any identified non-compliance. The risk assessment involves assessing each non-compliance against two criteria:

- the likelihood of environmental harm occurring, considering current and past environmental performance and potential contributing factors

the level of environmental impact caused or potentially caused by the non-compliance, such as the quantity and toxicity of the material and the sensitivity of the receiving environment.

Using the matrix in Table 1, each non-compliance is coded for risk: high risk (code red), moderate risk (code orange) or low risk (code yellow). There are also several licence conditions that do not have a direct environmental significance, but which are still important to the integrity of the regulatory system. These conditions relate to administrative, monitoring and reporting requirements. Non-compliance with these conditions is given a 'code blue' risk assessment.

**Table 1 Risk analysis matrix: combinations of environmental impact and environmental harm**

| Degree of impact | Certain harm | Likely harm | Less likely harm |
|---|---|---|---|
| **High impact** | Code red | Code red | Code orange |
| **Moderate impact** | Code red | Code orange | Code yellow |
| **Low impact** | Code orange | Code yellow | Code yellow |

## Which sites were audited?

Twenty-one licensed landfills were audited in the audit program, of which 14 were council operated and seven were privately owned. Sites were selected to obtain a representative sample of the sector and varied in size, location and the type of technology they used.

The appendix lists all sites audited.

### Design and operation of landfills audited

The 21 landfills audited vary in design and operations.

Most of the sites audited used weighbridges at the site entry to record incoming loads; four of the 21 facilities operated two or more verified[2] weighbridges. Four facilities did not have a weighbridge on site but estimated incoming loads, or trucks were weighed prior to arrival.

Seventeen landfills of the 21 audited have leachate barrier and collections systems installed on all or all new cells. Nine sites built before 1997 or built in former rock quarries with a sufficiently impermeable sub surface[3], are currently disposing of waste in cells that have no additional liner installed. Eighteen facilities are collecting leachate in evaporation ponds and/or leachate tanks for further treatment. Leachate is most often treated by evaporating it from leachate ponds. Three sites use additional leachate evaporators. Ten sites also irrigate leachate on capped and/or landfilled areas. One site is operating the landfill as a bioreactor[4].

[2] **Verified weighbridge** means a weighbridge that is verified in accordance with clause 36(3)(f) of the Waste Regulation.

[3] Hydraulic conductivity of in situ material is less than 1 x $10^{-9}$ metres/second to depths of at least 10 metres at all elevations around the landfill (NSW EPA 2016, p. 13).

[4] A **bioreactor** is a type of landfill in which leachate and water from other sources are recirculated through the waste to accelerate the decomposition of organic materials to methane and humus. (See also *Glossary* entry.)

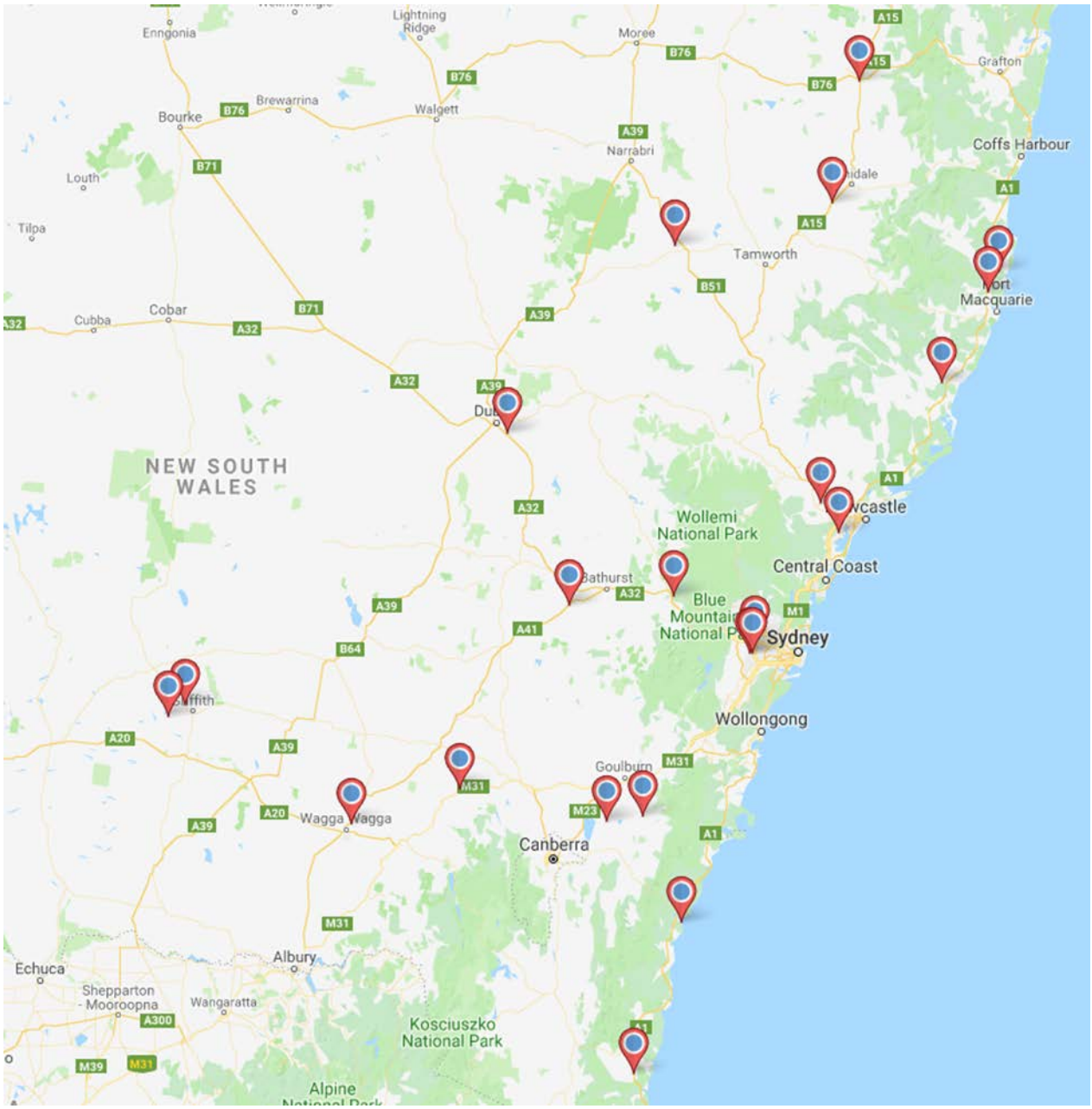
The cover material used is mainly virgin excavated natural material (VENM). Eight facilities also use approved alternative cover material, such as landfill lids, crushed concrete, woodchips and/or a polymer and fibre mix.

Six of the 21 landfills have a gas collection and treatment system (gas flares) installed and one landfill uses the generated gas to produce energy.

## Facility locations

The facilities audited include both coastal and inland plants: they are shown in Figure 10 and listed in the appendix. The EPA's public register contains details of all licences issued under the POEO Act. All licences can be accessed on the EPA website.

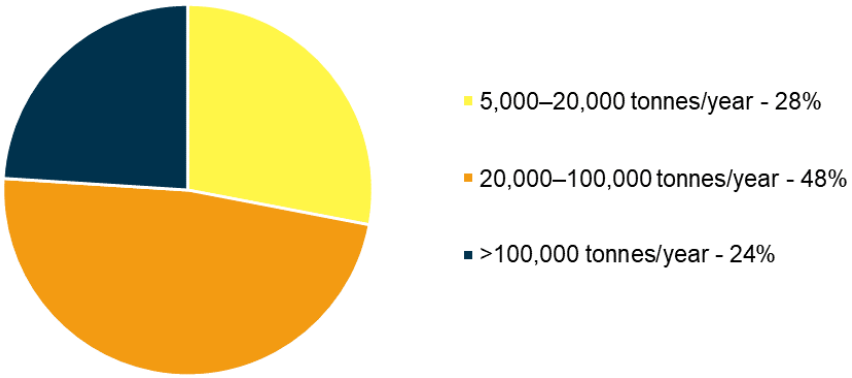
Figure 10 Locations of audited sites



## Facility size

The scale of the facilities audited, based on annual tonnages of waste disposed of by application to land, is shown in Figure 11.

Figure 11 Scale of facilities audited: yearly amount or limit of landfill



# 2. Audit findings

## 2.1. Overview of audit findings

Individual compliance audit reports, listed in the appendix, assess how each audited facility complies with the conditions attached to the statutory instruments and with environmental legislation administered by the EPA. This summary report presents the areas of concern identified from the 'non-compliances' and 'further observations' noted in the individual reports.

**Non-compliances** are reported where there is adequate evidence of a breach of licence conditions. **Further observations** are indicators of potential non-compliances or areas where environmental performance may be improved. Where an issue of environmental concern is observed that does not strictly relate to the scope of the audit or assessment of compliance, it is reported as a further observation.

**Table 2 Summary of assessments: numbers of compliance and non-compliances with requirements**

| Compliant | Non-compliant – Code red | Non-compliant – Code orange | Non-compliant – Code yellow | Non-compliant – Code blue | Not determined | Total |
|---|---|---|---|---|---|---|
| 1413 | 1 | 23 | 100 | 290* | 90 | 1917 |

* The 290 non-compliances consist of 145 non-compliances with the licence requirements and 145 non-compliances with Pollution Incident Response Management Plan (PIRMP) requirements.

## 2.2. Identification of areas of concern

The areas of concern identified during the audits are presented in Table 3. Some areas of concern are interrelated: for example, inadequate waste storage will lead to increased fire risks and stormwater pollution. Similarly, inadequate covering of waste creates a flow-on effect, generating potential problems with odour, litter and landfill gas generation; contamination of surface water; the tracking of waste; pests, vermin and weeds; and fire risks. Training of staff was of general concern and specific training has been identified within this report.

**Table 3 Areas of concern identified in the audits, and the number of facilities at which issues were identified**

| Area of concern | No. of facilities at which issue was identified (out of 21) |
|---|---|
| **Leachate management** | 12 |
| • Leachate barrier and collection | 7 |
| • Leachate storage and disposal | 12 |
| **Stormwater management** | 16 |
| • Erosion control | 6 |
| • Sediment control | 14 |
| **Water quality monitoring** | 19 |
| **Landfill gas management and monitoring** | 5 |
| **Amenity issues** | 17 |
| • Dust and odour control | 10 |

| Area of concern | No. of facilities at which issue was identified (out of 21) |
|---|---|
| • Litter and debris control | 8 |
| • Pest, vermin and weed controls | 9 |
| • Fire prevention and control | 9 |
| **Waste acceptance and site security** | 14 |
| • Waste acceptance | 11 |
| • Site security | 9 |
| **Storage and disposal of waste and materials** | 12 |
| • Storage of waste and materials | 12 |
| • Waste disposal and compaction | 9 |
| **Covering and capping of waste** | 13 |
| • Daily/intermediate cover | 12 |
| • Cover material | 7 |
| • Site capping and revegetation | 3 |
| **Pollution Incident Response Management Plan** | 21 |

## 2.3. Leachate management

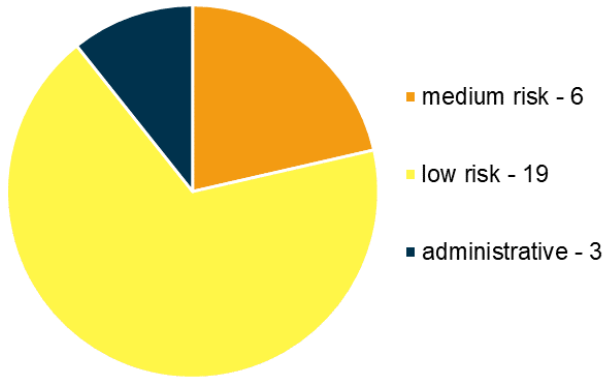
Leachate is generated when waste comes into contact with rainwater or surface water through precipitation and percolation. The water becomes contaminated with dissolved and suspended matter originating from stored or decomposing waste. Leachate that escapes from a landfill can contaminate groundwater, surface waters and soil, potentially polluting the environment and harming human health.

**Required outcomes** (NSW EPA 2016a)

- The landfill must have a leachate barrier system to contain leachate and prevent the contamination of surface water and groundwater over the life of the landfill.
- Pollutants with the potential to degrade the quality of groundwater must not migrate through the strata to any point beyond the boundary of the premises or beyond 150 metres from the landfill footprint, whichever is smaller.
- Collected leachate must be stored in appropriately sized dams or tanks and disposed of so as not to cause environmental harm.
- There must be sufficient leachate disposal capacity to prevent the build-up of leachate and to decrease the risk of water pollution and offensive odour.
- Untreated leachate must not be disposed of to an off-site water or land, used for dust suppression, or used to supply the water needs of any process conducted at the landfill, such as composting.

Issues related to leachate management were found in 12 out of 21 facilities audited. In total 28 non-compliances with licence or regulatory conditions were identified. Figure 12 summarises the risk ranking of the non-compliances.

Figure 12 Non-compliances relating to leachate management (total = 28)




## Main issues identified with respect to leachate management

- Leachate levels in landfill cell or sump riser were not maintained below the designated maximum height (three facilities).
- Leachate storage ponds and tanks were not maintained or operated in a proper and efficient condition: this included leachate levels, liners, pipelines, pumps and bunding (eight facilities).
- Leachate collection system was inadequate to capture all leachate generated including leachate from stockpiles, waste storage areas and irrigation (four facilities).
- Inspection of leachate management system and monitoring of leachate was not carried out regularly or as required (two facilities).
- Drains constructed to divert uncontaminated stormwater around areas used for landfilling were not adequately maintained, evidenced by sediment build-up and land slippage (four facilities).

Figure 13 Stormwater in contact with waste at a solid waste landfill. Any stormwater that has had contact with waste is considered leachate and needs to be properly contained and treated. Photo: Karin Schianetz/EPA

### Good leachate management practices observed during the audit inspections

- There were regular and documented inspections of leachate pond levels, integrity of tanks, pipelines and pumps.
- Evaporators for leachate ponds and leachate irrigation system were not operated during windy conditions, to avoid the risk of spray drift.
- Contingency measures were in place in the event of excess leachate generation, such as a liquid trade waste[5] agreement for leachate with the local water authority, and/or an emergency storage basin (kept empty to receive any overflow).
- Pump interlocks or water level sensors were installed to prevent leachate from being pumped out of the cell when the freeboard of the receiving dam is exceeded, or in case of pipeline rupture.
- A back-up electricity generator and back-up leachate pump was installed or available on site in case of power outages and/or equipment failure.

Figure 14 Well-managed leachate ponds with adequate capacity. Photo: Karin Schianetz/EPA

[5] **Liquid trade waste** means all liquid waste other than sewage of a domestic nature (DWE 2009)

Figure 15 An emergency leachate storage basin. Photo: Lucy Silk/EPA

## 2.4. Stormwater management

Uncontrolled stormwater runoff from landfill sites containing sediments and/or pollutants can have serious negative impacts on aquatic ecosystems. Murky water, for instance, can limit light transmission and change water temperature, and accumulations of sediment in water bodies can diminish water depth, choke seagrass beds and affect sensitive marine habitats.

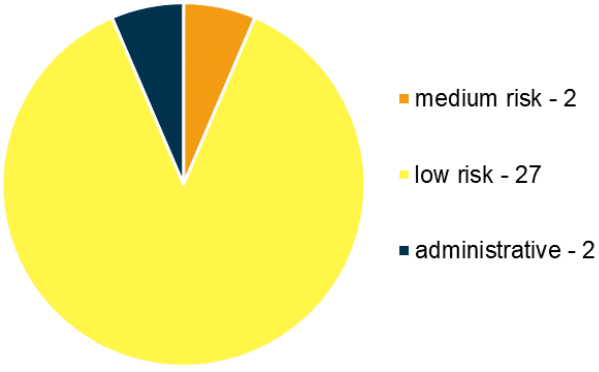
**Required outcomes**

- Controls must be implemented to minimise erosion and reduce the sediment load (suspended solids) of stormwater discharged from the site.
- Divert uncontaminated stormwater around landfilling or landfilled areas.
- Prevent contamination of stormwater with leachate.

Stormwater was managed inadequately at 16 of the 21 landfill sites audited. In total 31 non-compliances with licence or regulatory conditions were identified.

Figure 16 summarises the risk ranking of the non-compliances.

Figure 16 Non-compliances relating to stormwater management (total = 31)



### Main issues identified with respect to stormwater management

- Surface water drains were not maintained and kept clear of litter and weeds (eight facilities).
- Sediment ponds were not being pumped out following rainfall events to ensure sufficient capacity was retained for any additional rainfall, potentially resulting in sediment laden water discharging and polluting nearby waters (five facilities).
- Sediment ponds (or silt traps) were not desilted on a regular basis and vegetation was not removed to retain design capacity (11 facilities).
- Drains and bunds to divert uncontaminated stormwater around landfilled areas were not established or not maintained, causing the potential of an increase in leachate volume (six facilities).
- Level indicators not installed in sediment ponds and level indicator poles were not maintained appropriately (three facilities).
- Uncontaminated stormwater water was not being effectively diverted away from areas where waste was being (or had been) landfilled, resulting in generation of excess leachate during rainfall (four facilities).
- Uncontaminated stormwater was not being diverted away from waste stockpile areas (waste tyres, metals), resulting in surface water runoff potentially containing elevated total suspended solids levels and other contaminants being discharged to the sedimentation dam(s) (three facilities).
- Sediment ponds did not have adequate capacity, leading to discharge of water with high levels of suspended solids during high rainfall events (three facilities).
- Wastewater from wheel wash was not captured and treated (three facilities).
- Regular or appropriate maintenance inspections of surface water structures were not conducted (five facilities).

Figure 17 An undersized sediment pond with continuous discharge of sediment-laden water to surface waters. Photo: Karin Schianetz/EPA

### Good stormwater practices observed during the audit inspections

- Exposed areas, such as capped areas, were stabilised as soon as possible.
- Landfill cells were adequately bunded and bunds were inspected and maintained regularly to prevent uncontaminated stormwater from draining into landfilled areas.
- The water level of sedimentation pond(s) was checked and recorded daily and water quality was analysed and, if necessary, treated before discharge.
- Water from sedimentation ponds was regularly analysed for pollutants, checked to ensure it meets the licence discharge limits and used for dust suppression on site.

Figure 18 Intermediate soil stabilisation at a waste facility to protect soil from erosion before revegetation. Photo: Karin Schianetz/EPA

## 2.5. Water quality monitoring

Water quality monitoring of landfill facilities is vital to ensure that leachate and contaminated stormwater is not contaminating aquifers or water bodies.

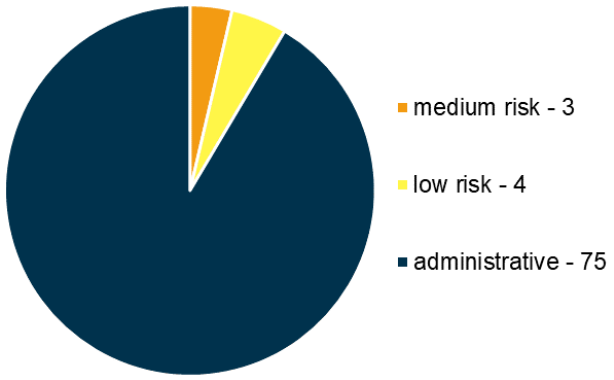
**Required outcomes**

A water quality monitoring program must be implemented. It must:

- characterise the quality and quantity of wastewater (leachate and stormwater) generated at the site
- detect any pollution of off-site surface water and groundwater
- ensure that appropriate notification, investigation and remedial procedures are followed when monitoring indicates that pollution may have occurred
- ensure that appropriate sampling and analysis methods are used in accordance with *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (NSW DEC 2004) and other recognised guidelines for matters not covered by the *Approved Methods*.

Water quality monitoring was not conducted adequately at 19 of the 21 facilities audited. In total 82 non-compliances with licence or regulatory conditions were identified. Figure 19 summarises the risk ranking of the non-compliances.

Figure 19 Non-compliances relating to water quality monitoring (total = 82)




## Main issues identified with respect to water quality monitoring

- Groundwater sampling was not conducted in accordance with relevant Australian Standards (five facilities).
- Surface water and/or leachate sampling were not conducted from the location specified in licence (six facilities).
- Groundwater monitoring bores were not located as specified in licence (six facilities).
- Sampling locations were not clearly marked or identifiable (seven facilities).
- Leachate levels (e.g. in landfill cell, leachate pond or at transfer points) were not monitored and/or recorded as required (four facilities).
- Sampling records (such as chain-of-custody and field sampling records) were incomplete or incorrect (nine facilities).
- Monitoring equipment (such as monitoring bores and leachate level monitors) were not inspected regularly and/or maintained in a proper condition (four facilities).
- Appropriate investigation and remedial procedures were not followed in response to groundwater monitoring data indicating potential contamination (six facilities).
- Water samples (such as routine sampling or sampling during overflow events) were not taken at the required frequency (eight facilities).
- Analysis results were not reported correctly (five facilities).
- The sample analyses were not carried out in accordance with either the EPA's approved methods or methods approved in writing by the EPA (18 facilities).
- Not all analytes specified in the licence were included in the monitoring program (three facilities).

Figure 20 A groundwater monitoring bore with a non-compliant casing.
Photo: Karin Schianetz/EPA

## Good water-quality monitoring practices observed during the audit inspections

- Monitoring points were appropriately signposted.
- Groundwater monitoring bores were provided with adequate protection, including where necessary locks to prevent accidental or deliberate damage, and locked where necessary.
- Procedures were in place to inspect monitoring points regularly.
- The EPA was notified of limit exceedances and analytical results were correctly reported.

Figure 21 A well-protected, locked and signposted groundwater monitoring bore.
Photo: Karin Schianetz/EPA

## 2.6. Landfill gas management and monitoring

Landfill gas emitted to air or migrating through the ground is a health and environmental risk. Landfill gas is explosive if it accumulates in confined spaces and it is also a strong greenhouse gas. Landfill gas must therefore be properly managed and treated, and landfill operators must ensure that their management practices are effective.

Required outcomes

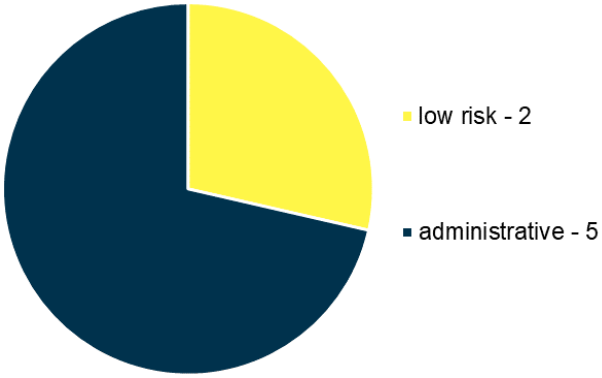
Landfill gas management practices must be adopted to:

- minimise emissions of untreated landfill gas to air and through sub-surface strata and services
- minimise greenhouse gas emissions (methane, the major bulk component of landfill gas, warms the planet by 86 times as much as carbon dioxide, according to the Intergovernmental Panel on Climate Change)
- minimise emissions of offensive odour
- minimise the explosive risk to humans from gas build-up in confined spaces
- ensure that, wherever feasible, landfill gas is sustainably utilised for energy recovery
- minimise emissions of air pollutants from the combustion of landfill gas in flaring or electricity-generating equipment.

Landfill gas was not managed and monitored adequately at five of the 21 facilities audited. In total seven non-compliances with licence or regulatory conditions were identified.

Figure 22 summarises the risk ranking of the non-compliances.

Figure 22 Non-compliances relating to landfill gas management and monitoring (total = 7)




### Main issues identified with respect to landfill gas management and monitoring

- Landfill gas monitoring was not conducted as required by the licence (e.g. with respect to monitoring frequency, monitoring locations, and units of measure) (six facilities).
- Landfill gas monitoring results and/or exceedances in methane levels were not correctly reported to the EPA (two facilities).
- Landfill gas flare was not maintained in a proper condition (one facility).

### Good landfill gas management and monitoring practices observed during the audit inspections

- Six facilities had a landfill gas extraction and treatment system (gas flare) installed (only 16 landfills receive putrescible general solid waste).
- Most installed landfill gas treatment systems (at five of the six facilities) were inspected regularly and were found to be well maintained and operating.
- At most landfills no offensive odour from landfill gas was observed during the audit inspections.

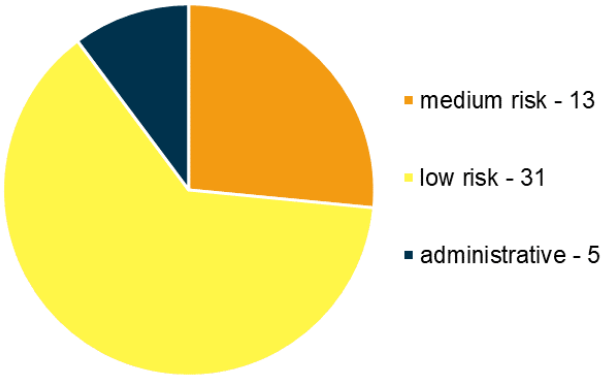
Figure 23 A well-operating landfill gas flare. Photo: Karin Schianetz/EPA

## 2.7. Amenity issues

Amenity issues were identified at 17 of the 21 facilities. In total 49 non-compliances with licence or regulatory conditions were recorded.

Figure 24 summarises the risk ranking of the non-compliances.

Figure 24 Non-compliances relating to amenity issues (total = 49)




### Dust and odour control

Emission of nuisance dust, other particulate matter and offensive odours degrade local amenity. Excessive dust emissions from landfill sites can also harm human health and the environment.

**Required outcomes**

- Offensive odour impacts must not occur at off-site locations.
- Emission of nuisance dust and other particulate matter beyond the landfill boundaries must be minimised.

Issues relating to dust controls were identified at eight of the 21 facilities audited.

## Main issues identified with respect to dust and odour control

- Access and haul roads were not maintained, with the potential for dust to be emitted from the facility (five facilities).
- A water cart was not available or used on an ongoing basis to suppress dust generated during operations, when dry and windy conditions prevail (four facilities).
- Speed limits on haul roads were not adhered to, generating excessive dust (two facilities).
- Asbestos waste disposed of at the facility was not wrapped as required and/or left uncovered, with the potential for asbestos dust to be emitted (four facilities).
- Waste (such as animal waste) not covered as required, generating offensive odour (four facilities).

Figure 25 Uncovered animal waste. Photo: Christopher Burt/EPA

## Good dust and odour prevention practices observed during the audit inspections

- A water cart was operating on unsealed haul roads.
- Speed limits on unsealed access roads were enforced and adhered to.
- Wheel washes were installed, operated and maintained in a proper condition to minimise dirt tracked from site to external roads.
- There was regular use of a road sweeper on sealed access road to minimise dust from dirt tracked from the site.
- Exposed areas were stabilised and revegetated.

Figure 26 Operating a water cart on unsealed haul roads. Photo: Christopher Burt/EPA

## Litter and debris control

Vehicles using landfills will inadvertently collect mud and litter on their wheels as they go to and from the tipping area. Litter and debris transported by garbage trucks and other vehicles as well as windblown litter from landfills is a nuisance to neighbouring properties and the community. Litter accumulating in stormwater systems and waterways blocks drains, reduces water quality and potentially harms sensitive freshwater species and marine life. Ninety-five per cent of litter found on beaches and subsequently in the ocean comes from suburban streets through the stormwater systems.

**Required outcomes**

- Local amenity must not be degraded by litter from the landfill or by mud or litter attached to vehicles leaving the landfill.

Litter and debris were not being adequately controlled at eight of the 21 facilities audited.

### Main issues identified with respect to litter control

- Litter fences were not installed or not appropriate to prevent windblown litter outside the landfill (five facilities).
- Litter fences not inspected and cleared of litter daily or as required (four facilities)
- Stormwater drains and sedimentation dams not kept free of litter (four facilities)
- Waste not adequately covered or compacted (see section 2.10, *Covering and capping of waste*), resulting in excessive windblown litter on site (four facilities)
- Wheel washes not inspected, maintained and cleaned out as required (four facilities).

Figure 27 Litter in stormwater drain. Photo: Karin Schianetz/EPA

Figure 28 Excessive litter accumulated at litter fence and beyond boundary.
Photo: Christopher Burt/EPA

## Good litter and debris control practices observed during the audit inspections

- Active tipping face was kept small, especially during windy conditions.
- Additional movable litter fencing was installed, or available for use if required.
- Litter fencing was inspected and cleaned daily, and the condition of fencing recorded in a daily inspection report by operational staff.
- Trash filters were installed for sedimentation dams and silt traps to prevent litter being washed into watercourses.
- Vehicles were washed out in a truck wash bay to remove litter.
- Wheel washes were installed at an exit road to remove mud and litter from vehicles.
- Entry and exit signs were installed advising customers of their responsibilities for making sure that their load is covered and that they are not littering public roads.

Figure 29 Additional mobile litter fencing available for use if required.
Photo: Christopher Burt/EPA

## Pest, vermin and weed control

Landfill sites can provide food sources and refuge for stock as well as native and feral animals such as birds, cats, foxes, goats, pigs and dogs. Additionally, exposed ground on landfill sites allows noxious and problematic environmental weeds to easily spread. As well as threatening biodiversity, this can also lead to the spread of endemic and exotic diseases for local and regional agriculture.

### Required outcomes

- Prevent infestation and spread of pest animals and invasive plant species.
- Prevent native wildlife and stock from entering the landfill site.

Issues related to controlling pests, vermin and noxious weeds were identified at nine of the 21 facilities audited.

### Main issues identified with respect to pest, vermin and weed control

- Weed control was not undertaken in a competent manner to prevent the spread of noxious weeds (six facilities).
- Vermin (such as foxes, rabbits and cats) were not being controlled as required (four facilities).
- Waste was not adequately covered, with the potential to encourage vermin and native birds (three facilities). See details under section 2.10, *Covering and capping of waste*.
- Waste stockpiles (such as tyres) were not managed in such a way as to minimise the spread of vermin (such as mosquitoes) (two facilities).

Figure 30 One of several European red foxes observed during daylight at a landfill site.
Photo: Winston Wickremeratne/EPA

### Good pest, vermin and weed control practices observed during the audit inspections

- A list of problem pests and weeds was included in weekly inspection check sheet, and operators noted any observations made during their site inspections.
- Appropriate stock- and wildlife-proof mesh fences were installed around landfilling area and/or leachate and sedimentation ponds to keep stock, native and feral animals out.
- Regular monitoring was undertaken by contracted experts of introduced noxious fauna and flora (such as fire ants, foxes and declared agricultural and environmental weeds).

Figure 31 Stock- and wildlife-proof mesh fence around a landfill site.
Photo: Karin Schianetz/EPA

## Fire prevention and control

Waste fires in NSW have demanded significant fire brigade resources and intervention over many days to extinguish them. The largest and longest-lasting fires often involve large stockpiles of unsorted waste with inadequate separation. These fires are difficult to control and can have a harmful impact on the environment, the local community and the waste industry itself. Underestimating the risk of fire at a landfill can be disastrous and is not acceptable (Fire and Rescue NSW 2019b).

**Required outcomes**

- Landfill operators must minimise any risks of fire and the site must be adequately prepared in the event of fire.
- Licensees must have in place procedures to deal with fire incidents, which must include measures to protect staff and the community from harm, and property and the environment from fire.
- Fire safety systems must be adequate to the special hazards identified within a waste facility and must also meet the operational needs of firefighters.
- Combustible waste material and hazardous substances must be stored separately and safely, taking into consideration expected combustibility and maximum pile size.
- Fire water run-off must be controlled and contained on site.
- Licensees must ensure that fire brigade vehicles have safe access to the facilities (Fire and Rescue, NSW 2019a).

Issues related to fire prevention and control were observed at 9 of the 21 facilities audited.

### Main issues identified with respect to fire prevention and control

- Hazardous material and waste material (e.g. tyres) were not stockpiled or stored in a way that minimises the risk of fire and the risk of a fire spreading from the stockpile (seven facilities).
- Combustible material was used to cover waste (three facilities).
- Staff were not trained in fire prevention and control procedures (four facilities).
- Fire-fighting equipment was inadequate or not regularly serviced (three facilities).

Figure 32 Gas cylinders stored unprotected and near combustible material.
Photo: Winston Wickremeratne/EPA

### Good fire prevention and control practices observed during the audit inspections

- Facilities were conducting regular fire drills on site.
- Waste stockpiles were kept small, and wastes, such as tyres and waste oil were collected regularly.
- Stockpiles were located away from bush areas and separated to reduce spread of fire.
- Combustible waste materials (e.g. recyclables, wood, metal with combustible contaminants, and tyres) were stockpiled well away from tipping areas.
- Fire sprinkler systems were fitted and operational at the recycling plant storage areas located at the landfill site.
- Well-accessible fire hydrants were installed throughout the site, and close to combustible stockpiles.
- Sites maintained fire-fighting equipment according to a regular schedule (e.g. three-monthly test operation of the equipment) and facilities visually checked equipment for damage on a weekly basis.
- Sites had signs installed at the entry point alerting to fire risks on the landfill and emergency procedures.

Figure 33 Safe, separate and clearly labelled storage of gas bottles.
Photo: Nicole Wilmot/EPA


## 2.8. Waste acceptance and site security

Landfills are only licensed to receive types and quantities of waste that can be safely handled, stored and disposed of at the facility. Unlicensed wastes have potential risks to the community, health and safety of staff and the environment, which the facility may not be adequately equipped to manage.

Site security and fencing is a public liability issue for the landfill operator to manage. Active landfill sites can present a safety risk to the public, livestock and native wildlife.

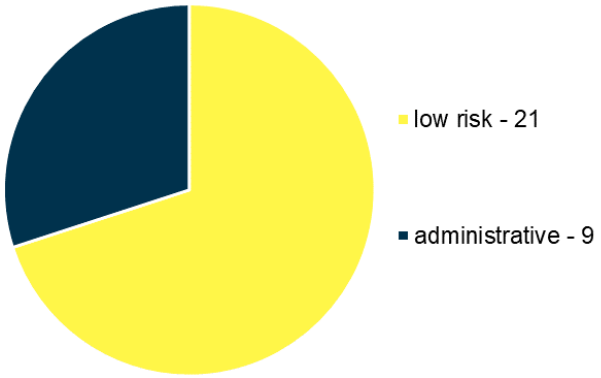
**Required outcomes**

- Only authorised wastes must be received at the site.
- Any unauthorised wastes delivered to the site must be appropriately managed and disposed of lawfully.
- Statutory record-keeping and reporting requirements must be complied with.
- The premises must be secure, and unauthorised entry must be prevented.

Waste acceptance and site security procedures were not being adequately implemented at 14 of the 21 facilities audited. In total 30 non-compliances with licence or regulatory conditions were identified.

Figure 34 summarises the risk ranking of the non-compliances.

Figure 34 Non-compliances relating to waste acceptance and site security (total = 30)




## Main issues identified with respect to waste acceptance and site security

- Unlicensed waste types, such as clinical waste, chemically treated telegraph poles, household furniture and mattresses, were accepted for disposal (four facilities).
- Waste tonnages were received and disposed of or stored above the annual licence limits (four facilities).
- Staff training and screening procedures were not adequate (three facilities).
- Fencing was not installed as required by the licence or not maintained to control entry to the premises (nine facilities).
- Gates were not lockable at all access and departure locations or gates were not locked when site was unattended (three facilities).

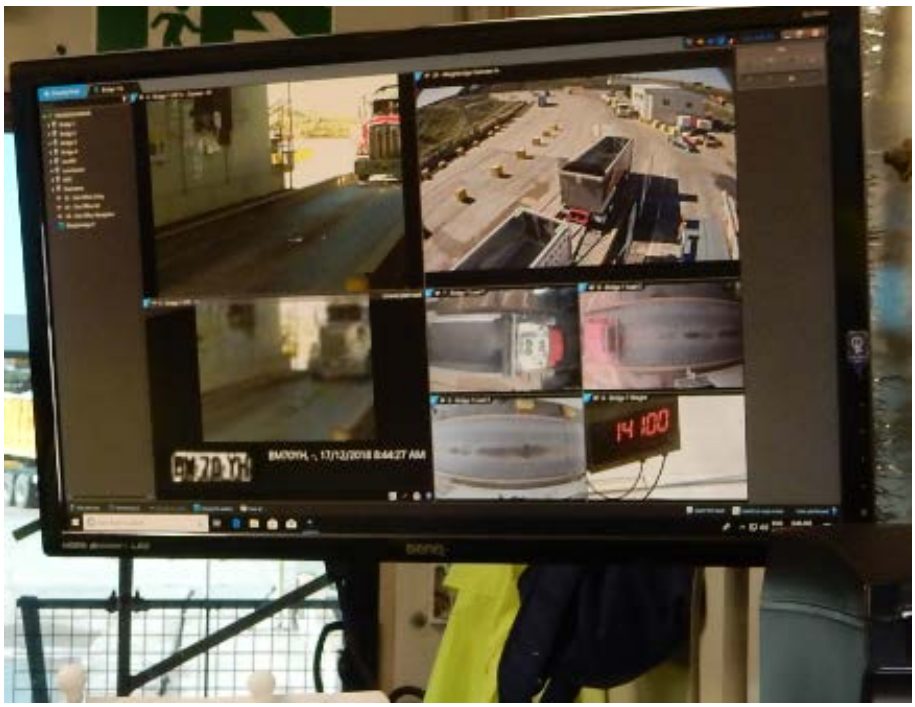
Figure 35 Waste tyres stored in excess of the licence limit of five tonnes.
Photo: Christopher Burt/EPA

## Good waste acceptance and screening practices observed during the audit inspections

- All verified weighbridges that were inspected during the audits had been calibrated as required.
- Weighbridge staff kept detailed records of waste loads that were not be accepted, including licence plate of delivery vehicles, and staff provided information about where or how the waste could be accepted.

- Cameras and viewing platforms were installed at the weighbridge to allow weighbridge staff to screen waste loads in trucks.
- Operational staff at the tipping phase were informed by weighbridge personnel of suspicious loads of building material and checked loads for asbestos before and during unloading.
- 24-hour security cameras were installed at the entrance gate.
- Inspection of the perimeter fence was included in the daily/weekly site inspection.
- Wombat- and kangaroo-proof 1.8-m fence installed and maintained to prevent wildlife from entering leachate ponds.
- There was clear and easy to read signage at the entrance about licenced and prohibited wastes.

Figure 36 Cameras installed at weighbridge for load inspection. Photo: Karin Schianetz/EPA



## 2.9. Storage and disposal of waste and materials

Inadequate storage, disposal and compaction of wastes increases fire risks, can lead to dust and odour emissions, vermin infestations, and/or surface water and groundwater pollution.

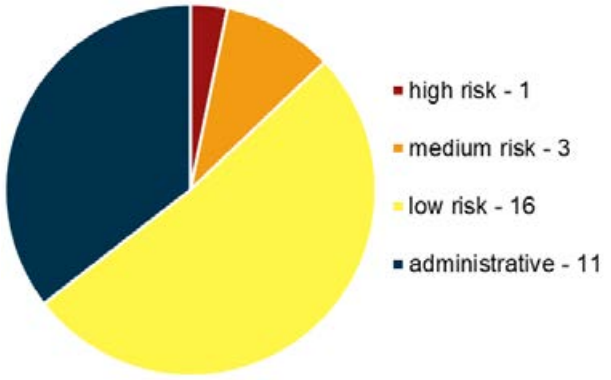
Proper pre-treatment and compaction of waste not only minimises the amount of land used for waste disposal but also improves the stability of landfills, and minimises voids that would encourage vermin, fires or excess generation of leachate.

**Required outcomes**

- Waste must be stored in a manner that prevents any soil contamination, surface and groundwater pollution, dust emissions and vermin infestation.
- Waste must be pre-treated (e.g. tyres shredded) and disposed of in the landfill cell so that it is stable and can be covered by VENM or other approved cover material.
- Waste must be compacted daily to maximise compaction rates and minimise settlement.
- Waste must be disposed of in accordance with approved filling plans where applicable.

Storage and disposal of wastes was not undertaken in a proper and efficient manner in 12 of the 21 facilities audited. In total 31 non-compliances with licence or regulatory conditions were identified. Figure 37 summarises the risk ranking of the non-compliances found.

Figure 37 Non-compliances relating to storage and disposal of waste and materials (total = 31)




## Main issues identified with respect to storage and disposal of waste and materials

- Hazardous wastes such as fuel/oil tanks, waste oil, empty oil drums, gas bottles, scrap metal and old cars were not stored in a proper and efficient manner, increasing the likelihood of soil and water pollution (seven facilities).
- Large open stockpiles of waste tyres, green waste, pallets and timber were stored without adequate controls, increasing the risk of pollution of water, spread of vermin and fire (see also section 2.7, *Amenity issues*, and Figure 35) (six facilities).
- Disposal was not undertaken in accordance with approved filling plans or filling plans were not updated as required (four facilities).
- Disposal of unauthorised waste types and/or exceedance of waste disposal or storage limits (see section 2.8, *Waste acceptance and site security*) (five facilities).
- Minimum compaction rates were not achieved or not monitored as required (four facilities).
- Biosolids and/or green waste were stockpiled on a natural soil surface that had not been assessed as impermeable (two facilities).

Figure 38 Gas bottles stored with oil drums on unprotected surfaces.
Photo: Karin Schianetz/EPA

### Good waste storage and disposal practices observed during the audit inspections

- Waste oil collection was undertaken on sealed bunded surfaces and under cover.
- Stockpiles were kept small, and wastes such as tyres and scrap metal were collected regularly.
- Stockpiles were kept away from bush areas and separate, to reduce the spread of fire.
- Fridges were stored upright and degassed to prevent coolant leaks.
- Tipping areas were kept small.
- Asbestos waste was disposed of in designated areas, which were recorded in landfilling plan.
- Tyres and mattresses were stored in storage crates.
- Storage areas were well labelled and inspected frequently.
- Well-stocked spill kits were available and kept close to the storage areas for hazardous materials.

Figure 39 Safe undercover storage of tyres. Photo: Lucy Silk/EPA

Figure 40 Sealed, well-labelled, undercover storage areas for hazardous wastes. Photo: Nicole Wilmot/EPA

## 2.10. Covering and capping of waste

Cover material is classified as daily or intermediate, depending on the operational phase and function. Daily cover is the term used to describe material spread over deposited waste at the end of each working day. Intermediate cover is used to close off a cell that will not receive additional lifts of refuse for some time and has not yet been capped.

Occupiers must use VENM as cover material or obtain the EPA's approval to use an alternative cover material.

Specific requirements for landfilling and covering asbestos waste and clinical waste are contained in the POEO (Waste) Regulation 2014.

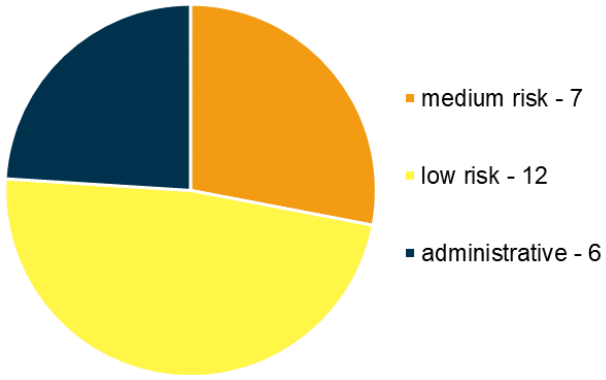
All completed landfill cells must be capped and revegetated as soon as practicable after the final delivery of waste to the cell.

**Required outcomes**

- Landfilled waste must be covered regularly during operations with a suitable material to minimise odour, dust, litter, the presence of scavengers and vermin, the risk of fire, rainwater infiltration into the waste (and therefore the amount of leachate generated) and the emission of landfill gas.
- The final capping must reduce rainwater infiltration into the waste, stabilise the cell surface, reduce contaminated water runoff, minimise landfill gas and odour emissions, litter, pests and vermin, and the risk of fire.

Covering and capping of wastes was not undertaken in a proper manner at 13 of the 21 facilities audited. In total 25 non-compliances with licence or regulatory conditions were identified. Figure 41 summarises the risk ranking of the non-compliances.

Figure 41 Non-compliances relating to covering and capping of wastes (total = 25)




### Main issues identified with respect to covering and capping of waste

- Daily and or intermediate cover was not applied in accordance with requirements (12 facilities).
- Cover material other than VENM, that was not approved by the EPA, was used (eight facilities).
- Insufficient approved cover material was stored on site (three facilities).
- Asbestos wastes were not covered as required, with the potential to cause adverse effects on human health (four facilities).
- Animal wastes were not covered in a timely manner to reduce odour emissions and vermin (two facilities).
- Final capping was not conducted in a timely manner or waste was not completely capped (two facilities).

Figure 42 Large areas of waste kept uncovered. Photo: Karin Schianetz/EPA

## Good waste covering and capping practices observed during the audit inspections

- Asbestos was disposed of in designated asbestos pits, where it could be covered more efficiently and safely.
- Staff were trained regularly in asbestos identification and proper asbestos handling, disposal and covering procedures.
- Cover material was stored in adequate quantities adjacent to the active tipping face.
- Approved alternative cover material, such as landfill lids, tarping and crushed concrete, was used.

Figure 43 Proper use of landfill lids as alternative cover material.
Photo: Gavin Hughes/Kempsey Shire Council

## 2.11. Pollution Incident Response Management Plan

A Pollution Incident Response Management Plan (PIRMP) is a document that outlines what procedures are in place to minimise the risk to human health and the environment from a pollution incident on a premise. This includes having clear and effective notification, action and communication procedures to ensure that the incident is dealt with promptly and safely, environmental harm is minimised, and all relevant people and authorities are notified and kept informed throughout the incident.

All licence holders are required to prepare a PIRMP in accordance with section 153A of the POEO Act.

**Required outcomes**

- The PIRMP must include the information detailed in the POEO Act (section 153C) and be in the form required by the POEO (General) Regulation (clause 98B).
- Licence holders must keep the PIRMP at the site to which the licence relates and must publish specific parts of the PIRMP on their website (section 153D, POEO Act).
- Licence holders must test the PIRMP in accordance with the POEO (General) Regulation (clause 98E).
- If a pollution incident occurs in the course of an activity so that material harm to the environment is caused or threatened, the licence holder must immediately implement the plan (section153F, POEO Act).

All audited licensees had developed PIRMPs, but no licensees were compliant with all PIRMP requirements. There were 145 non-compliances, including:

- The facility did not notify all authorities of a pollution incident that had occurred and did not notify the neighbouring community likely to be affected by the incident (one facility).
- The current PIRMP was not available at the site (three facilities).
- The PIRMP had not been tested at least once every 12 months (four facilities) or was not tested within one month of a pollution incident (six facilities).
- The required PIRMP information was not available on the licensee's website (two facilities).
- The PIRMP did not contain all the required information (21 facilities). In detail, it lacked:
    - the pollution incident notification procedures for the licensed facilities (two facilities)
    - detailed description of the action to be taken, immediately after a pollution incident, by the licensee (five facilities)
    - procedures for coordinating with the notified authorities any action taken in combating the pollution caused by the incident (six facilities)
    - a description of the hazards (six facilities) and the likelihood of the hazards occurring (eight facilities)
    - an inventory of all potential pollutants kept on the premises or used in carrying out the relevant activity and/or the maximum quantity of these pollutants (twelve facilities). This should include sediment laden water and leachate in ponds
    - a description of any safety equipment or other devices used to minimise the risks to human health or the environment and to contain or control a pollution incident (six facilities)
    - the names, positions and 24-hour contact details of key personnel (four facilities)
    - the contact details of all relevant authorities. This should include the EPA, local council, Ministry of Health, SafeWork, and Fire and Rescue NSW (three facilities)
    - the mechanisms for providing early warnings to occupiers of nearby facilities (five facilities)
    - arrangements for minimising the risk of harm to persons on site (five facilities)

- adequate maps of the site and surrounding areas. Key information (e.g. the location of potential pollutants, surrounding areas most likely affected by a pollution incident, and the location of stormwater drains) was not shown (19 facilities)
- a description of how any identified risk of harm to health will be reduced (eight facilities)
- the nature and objectives of any staff training program (four facilities)
- the dates on which the plan was tested and the names of persons who carried out the test (16 facilities)
- the dates on which the plan was updated (seven facilities)
- the manner in which the plan is to be tested and maintained (eight facilities).

### Where to find help to comply with PIRMP obligations

The EPA has prepared a new guideline to assist holders of a licence to comply with their PIRMP obligations. The guideline sets out the requirements for preparing, keeping, testing and implementing PIRMPs under the POEO Act in detail. It highlights some of the common issues the EPA has identified, and ways licence holders can address them.

## 2.12. Other issues identified

Issues of environmental concern that did not strictly relate to the scope of the audit or assessments of compliance were also recorded as 'further observations'. These included the following.

- Pollution monitoring data was not published on the licensee's website as required.
- Monitoring data and other information (such as PIRMP testing dates in the facility's Annual Return) was reported incorrectly.
- Spill kits on site were not maintained and contained rubbish.
- Dust monitoring was not conducted in a proper manner and in accordance with requirements of Australian Standards.

## 2.13. After the audits

### Follow-up

The EPA has required the licensees audited in this program to rectify any non-compliances identified and has in place a systematic and rigorous follow-up process to ensure that the landfills are complying with their licence requirements.

Since the individual audit reports were finalised, follow-up by the EPA has shown that the audited licensees have completed the required actions or put plans in place to do so.

Actions taken include:

- leachate pump interlocks, leachate level sensors, and digital leachate level loggers installed
- surface water drains cleaned out and repaired, and silt/sediment control fences installed
- sediment ponds and silt traps desilted and cleaned out, and new pumps and level indicators installed
- alternative cover materials approved and included in licences
- capping and intermediate cover applied
- landfill gas flare repaired
- damaged litter and perimeter fences repaired and/or replaced
- wheel washes cleaned out
- vehicle wash-bay areas sealed and adequately bunded

- new water cart for dust suppression purchased, and budget raised for purchase of new landfill compactor
- speed-limit signs installed
- weeds removed and vermin control measures implemented
- perimeter fences maintained and repaired
- groundwater monitoring bores updated, repaired, labelled and signposted
- Pollution Incident Response Management Plans, Fire Management Plans, and monitoring and operating procedures updated and implemented
- staff training and toolbox talks given on environmental hazards, pollution incidents, fire response and other operational procedures (such as waste receival, proper waste disposal, and litter and dust management)
- licence conditions reviewed and modified.

## Ongoing compliance actions

The EPA will continue to proactively monitor the compliance of all landfills, using a range of regulatory tools including education, site inspections, targeted compliance campaigns and investigations of complaints and incidents.

The audit findings will be presented to key stakeholders. Landfill licensees not audited in this program will be encouraged to use the audit findings given in the summary report to inform their review of processes and procedures and improve their compliance and environmental performance.

## Working with local government

The audit program provided an opportunity for the EPA to work together in partnership with councils to help council-operated landfills improve their environmental and compliance performance.

The EPA will continue to support councils by providing training and guidance to council officers and operators of landfills to undertake their activities in a manner that minimises environmental impact and that enables them to comply with regulatory requirements.

The EPA has held two training courses for council staff, including supervisors, aimed at improving knowledge and understanding of:

- relevant waste and resource recovery policies, practices and legislation that apply to waste and resource recovery facilities
- waste material types and the respective recycling and resource recovery option for each material type, so the workers can identify opportunity to increase the quality and quantity of material recovered and recycled
- relevant waste collection, storage, handling and processing equipment types
- relevant *Waste Less Recycle More* programs and opportunities to apply for grants.

There is a range of courses accessible to council officers, both face-to-face and available through the EPA Learning website, including:

- Compost Facility Management
- Litter Enforcement.

The EPA also provides training courses tailored to the specific needs of council officers, such as the training needed to become Council Authorised Officers and training in Environmental Auditing. These courses are held at the request of councils and can be made by contacting the EPA Training Unit.

### Integration with regulatory reviews

The EPA will use the findings of this audit program to guide the review of environment protection licences. Section 78 of the POEO Act requires the EPA to review environment protection licences once every five years.

These regulatory reviews:

- focus on desired environmental outcomes
- enhance consistency between regulatory instruments issued to an industry
- improve the effectiveness of the regulatory system
- strengthen each department's accountability to stakeholders.

Integrating these reviews with other regulatory activities, such as inspections, assessments and compliance audit programs, results in a holistic approach to regulation of the waste sector.

The audit findings will also help the EPA to assess any future applications for new licences and ensure that regulatory requirements placed on licences effectively deal with any potential environmental impacts.

## 2.14. Related initiatives

The compliance audits of the management of landfills in NSW sits within a broader EPA framework for the management of the waste industry. Related initiatives are outlined here.

The following related initiatives may also help councils and other landfill operators to identify ways in which the management of solid waste landfill facilities can be undertaken more effectively to reduce their impact on the environment.

### EPA training courses for landfill and waste facility operators

The EPA has developed online courses that could be useful for training landfill and waste facility staff, e.g. Compost Facility Management, Odour management, Multi-agency Asbestos Education Program, and Waste Levy Compliance Essentials.

The EPA is also looking to develop online learning modules on landfill operations, to provide fundamental knowledge of processes and operations of a landfill. The modules are scheduled to be accessible online via the EPA learning website by the end of 2021.

For further information refer to https://learning.epa.nsw.gov.au/blocks/androgogic_catalogue/index.php.

### Fire safety in waste facility

Landfill operators are required to implement the Fire and Rescue NSW's guideline, Fire safety in waste facilities (Fire and Rescue NSW 2019b; www.fire.nsw.gov.au). The fire safety guideline outlines standard approaches for fire risk management, fire safety systems, storage, stockpiles and planning at waste facilities.

The EPA has also developed a fact sheet on fire safety at waste facilities, https://www.epa.nsw.gov.au/your-environment/waste/waste-facilities, to provide a quick overview of the fire safety guideline and the roles of consent and regulatory authorities involved in minimising fire risk.

### Litter and illegal dumping

The NSW Government is committed to reducing litter and illegal dumping. The EPA is implementing actions to fulfil that commitment through targeted programs and regulation.

The EPA has developed the *NSW Litter Prevention Strategy*, which provides the framework the EPA uses to prioritise funding and action to reduce litter and achieve the set objectives and targets. A critical part of the strategy is the two-year *Litter Prevention Implementation Plan 2019–20*, which outlines the timeframes for the implementation of the specific actions by the EPA and its delivery partners.

Additionally, the EPA has developed the *NSW Illegal Dumping Strategy*, designed to deliver an integrated approach to the problem, uniting action on education, enforcement and infrastructure to discourage people from dumping, and takes strong action against persisting illegal waste operators. The NSW Illegal Dumping Strategy outlines clear actions the EPA and its partners can take to reduce illegal dumping in NSW of different kinds of waste, from waste outside multi-unit dwellings to large-scale illegal landfilling. The strategy aims to address issues through continued collaboration with the EPA's partners, local government, land managers, community organisations and industry.

The EPA also provides and manages grant funding programs to help councils, organisations and individuals combat local littering and illegal dumping. EPA grants to prevent illegal dumping include:

- Combatting Illegal Dumping: Clean-up and Prevention Program (for councils and public agencies, and community groups)
- Aboriginal Land Clean Up and Prevention Program (for Local Aboriginal Land Councils)
- Householders' Asbestos Disposal Scheme.

The strategies and detailed information about the EPA grants can be accessed at https://www.epa.nsw.gov.au/your-environment/litter-and-illegal-dumping.

## Waste levy

The *Protection of the Environment Operations Act 1997* (POEO Act) requires certain licensed waste facilities in NSW to pay a contribution for each tonne of waste received at the facility. Referred to as the 'waste levy', the contribution aims to reduce the amount of waste being landfilled and promote recycling and resource recovery.

The details and calculation of the waste levy payable by licensed waste facilities are set out in the Protection of the Environment Operations (Waste) Regulation 2014 and the Waste Levy Guidelines. To better explain the details and calculation of the waste levy, the EPA has also developed the following information:

- Waste Levy Benchmark Requirements – output reporting for each transaction at levy-paying facilities. The requirements are not all mandatory, but they are a benchmark of good recording and reporting
- Waste reporting definitions – a table listing the waste type, code and waste type description and is intended to help with the input of the correct waste code

Information about the waste levy can be accessed at https://www.epa.nsw.gov.au/your-environment/waste/waste-levy.

## Asbestos waste

Asbestos waste disposal presents complex and unique problems. The human health risk of asbestos can be managed with correct handling, storage, transport and disposal. However, environment protection agencies and local authorities across Australia still struggle with illegal dumping and improper disposal. Recent reports from the NSW Ombudsman and the Independent Commission Against Corruption highlight this as an ongoing issue.

The *NSW Asbestos Waste Strategy* focuses on improving the management of asbestos waste, including asbestos in soil. There is no one-size-fits-all approach to managing asbestos waste. The *NSW Asbestos Waste Strategy 2019–21* aims to find ways to:

- make it easier and cheaper to dispose of asbestos waste legally
- educate people on the risks of poor asbestos waste management and the benefits of doing it well
- create better systems for tracking asbestos waste from generation through to disposal
- strengthen the regulatory framework
- continue to build ongoing collaborative relationships with our partners and work together
- monitor and evaluate our progress on a regular basis.

The six approaches in this strategy are interrelated and should operate together.

The *NSW Asbestos Waste Strategy* can be downloaded from https://www.epa.nsw.gov.au/your-environment/waste/industrial-waste/asbestos-waste-strategy.

# Glossary

**Action program:** an action or series of actions that the licensee is required to undertake to correct an identified non-compliance. It is issued in association with an expected completion date.

**Analytes:** chemicals and other substances (e.g. in water), the concentrations of which must be determined by chemical analysis.

**Aquifer:** an underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt, or clay) from which groundwater can be usefully extracted by using a water well.

**Audit:** a systematic, independent and documented process for obtaining objective evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled (ISO 19011:2018).

**Audit criteria:** defined requirements against which the auditor compares collected audit evidence. Criteria may include regulatory requirements, standards, guidelines or any other specified requirements.

**Audit evidence:** evidence collected to assess compliance, including documentary evidence and any evidence collected during an audit inspection of the site (e.g. auditor's observations, photographs, videos and evidence provided by the licensee during interviews).

**Audit inspection:** the step in the audit process where auditors visit the licensed site to conduct meetings, interviews, observe operations and collect evidence against which compliance will be assessed.

**Audit scope:** the extent and boundaries of the audit (e.g. locations, organisational units, activities and processes to be audited) and the time period covered by the audit.

**Bioreactor (landfill):** a type of landfill in which leachate and water from other sources are recirculated through the waste to accelerate the decomposition of organic materials to methane and humus. The short-term generation of landfill gas may be increased, often enabling it to be used for energy recovery. The waste may be biodegraded and stabilised quickly, reducing the post-closure care and maintenance period.

**Biosolids:** organic products resulting from sewage treatment processes (also called 'sewage sludge').

**Cell:** a discrete unit of a landfill that is physically separated from other waste emplacements at the site.

**Code blue:** a non-compliance for licence conditions that do not have a direct environmental significance but are still important to the integrity of the regulatory system. These conditions relate to administrative, monitoring and reporting requirements.

**Code orange:** a non-compliance of environmental significance but one where remedying the non-compliance can be given a lower priority than a red risk assessment.

**Code red:** a non-compliance of considerable environmental significance that must be dealt with as a matter of priority.

**Code yellow:** a non-compliance that could receive a lower priority than a red or orange risk code, but the non-compliance is still important and must be addressed.

**Combustible waste material:** any solid waste material that can readily ignite and burn under normal conditions. It includes (Fire and Rescue NSW 2019):

- paper and cardboard
- wood and wood-based products
- plastic

- rubber
- textiles
- waste-derived fuels such as refuse-derived fuels (RDF), solid recovered fuels (SRF) and processed engineered fuels (PEF)
- metal with combustible contaminants
- any other waste material that may pose a notable fire risk like those above.

**Compliance:** there is sufficient and appropriate evidence to demonstrate the requirement has been complied with and is within the scope of the audit.

**Compost:** reprocessed organic waste meeting Australian Standard AS 4454–2012, *Composts, Soil Conditioners and Mulches*.

**Daily cover:** material applied on the tipping face of the landfill upon close of business each day to reduce environmental and amenity impacts.

**Environment protection licence (licence):** a licence that authorises the carrying out of scheduled activities or controls pollution arising from non-scheduled activities, being a licence issued under Chapter 3 of the *Protection of the Environment Operations Act 1997* and in force. Most new landfills must be licensed, with minor exceptions depending on the scale of the landfill and the type of waste received.

**Environmental harm:** includes any direct or indirect alteration of the environment that has the effect of degrading the environment and, without limiting the generality of the above, includes any act or omission that results in pollution.

**Facility:** any site where a scheduled or non-scheduled activity is undertaken.

**Fire brigade vehicles:** any vehicle that forms part of the equipment of a fire brigade and that is equipped with an audible warning device and flashing lights (Fire and Rescue NSW 2019a).

**Fire water run-off:** residual water used in fighting the fire, which may be contaminated with substances used to fight the fire, the products of combustion and unburnt materials washed off fire debris.

**Flammable waste:** readily combustible wastes and wastes that may cause fire through friction.

**Flare:** a burner used for the combustion of landfill gas, including the conversion of methane to carbon dioxide and the destruction of the majority of non-methane volatile organic compounds present in the gas.

**General solid waste:** any waste that is classified or assessed as general solid waste in accordance with the *Waste Classification Guidelines* (NSW EPA 2014). The definition further breaks the waste up into putrescible and non-putrescible components.

**General solid waste landfill:** a landfill licensed under the POEO Act for disposal of wastes classified as general solid waste.

**Geomembrane:** a synthetic landfill liner comprising a thin plastic film (a minimum of 2 millimetres thick), usually manufactured from high-density polyethylene or linear low-density polyethylene or other polyolefins.

**Geosynthetic clay liner:** a manufactured liner consisting of a thin layer of bentonite ‘sandwiched’ between layers of geotextiles.

**Hazardous waste:** any waste that is classified as hazardous in accordance with the *Waste Classification Guidelines* (NSW EPA 2014). Hazardous waste cannot be disposed of to landfill unless it is treated to remove or immobilise the contaminants.

**Hazardous materials:** anything that, when produced, stored, moved, used or otherwise dealt with without adequate safeguards to prevent it from escaping, may cause injury or death or damage to property.

**Hydraulic conductivity:** a measure of the ease with which a liquid can move through a substance (in units of cubic metres/square metre/second, or simply expressed as metres/second). It depends on the material's permeability, the liquid flowing through it and the degree of saturation. Saturated hydraulic conductivity to water is a measure of water flow through saturated media: it must be relatively high for leachate drainage layers (greater than $1 \times 10^{-3}$ metres/second for gravel) and relatively low for leachate barriers (less than $1 \times 10^{-9}$ metres/second for clay).

**Landfill gas:** gaseous emissions from the anaerobic decomposition of organic waste materials placed in a landfill. About 90% of landfill gas is methane and carbon dioxide, in roughly equal amounts depending on the phase of the waste decomposition and other factors, such as oxygen levels. These are sometimes called bulk landfill gases.

Landfill gas also contains water vapour and small amounts of various volatile organic compounds, aldehydes, organosulfurs (including mercaptans), hydrogen sulfide and ammonia. These are sometimes called trace landfill gases.

Landfill gas can be generated over a long time. Modelling suggests that about 30% of total landfill gas generation can occur before landfill closure; 50% occurs during the first 30 years after closure and the remaining 20% occurs 30 to 100 years after closure (Landfill Gas Emissions Model (LandGEM) Version 3.02, USEPA, 2005).

Landfill gas can be flammable or explosive when mixed with air at methane concentrations of 5% to 15% (on a volume per volume basis). It can be an asphyxiant when allowed to accumulate in enclosed spaces. It is typically highly odorous owing to the presence of trace gases. (Methane and carbon dioxide are odourless.) It can kill vegetation in the vicinity by displacing oxygen in the soil. It is a greenhouse gas: methane is 21 to 25 times more potent than carbon dioxide as a greenhouse gas.

**Leachate:** the liquid that passes through, or is released by, waste. It arises from the inherent moisture content of the waste and from rainwater (and sometimes groundwater) percolating through or contacting the waste mass. Leachate may contain high levels of dissolved solids, ammonia, organic matter, and sometimes metals and other pollutants. These levels are typically well above background levels for undisturbed or slightly disturbed groundwater and surface water systems. The levels are also well above national quality guidelines for drinking water and other beneficial reuses of water.

**Leachate riser:** a vertical pipe through which leachate is pumped from a drainage sump into surface leachate dams or tanks.

**Licence conditions:** stipulations listed on the environmental protection licence outlining the requirements with which the licensee must comply.

**Licensed site:** any site where a scheduled activity is undertaken for which the licensee has obtained a licence to do so.

**Liner:** a low-permeability layer installed on the floor and walls of a landfill as part of a leachate barrier system to minimise the escape of leachate (and also gas, if present). Typical liner materials are compacted clay liners and factory-manufactured geosynthetic liners. Liners are also installed in final caps at landfills to limit rainfall infiltration. In caps they are usually referred to as sealing layers.

**Methane:** a colourless, odourless gas that is generated under anaerobic conditions in most landfills containing degradable organic carbon.

**Monitoring:** being aware of the state of a system. The process of monitoring involves collection, analysis and interpretation of data to determine the state of the system and how the system is changing.

**Monitoring data:** data collected for characterising changes in an event as the result of a direct observation or experiment. The facts are usually numbers that reflect the result of a measurement determined from observations or experiments.

**Monitoring frequency:** the frequency with which a licensee is required to collect samples, as required by their licence.

**Non-compliance:** clear evidence has been collected to demonstrate the requirement has not been complied with and is within the scope of the audit.

**Not determined:** insufficient evidence is available to allow an evidence-based assessment of compliance to be made.

**Offensive odour:** defined in section 129 of the POEO Act. Essentially it is an odour of a character, duration or time of occurrence that could harm, or unreasonably interfere with the comfort of, a neighbouring resident.

Odours are commonly generated at landfills receiving organic waste because of decomposition of these wastes under anaerobic conditions. The primary odorous compounds are mercaptans, hydrogen sulfide and various complex organic compounds.

Odour production rates from landfills are highly variable, depending on the type of waste, its moisture content, the extent of its decomposition, the type and extent of cover material, whether or not landfill gas collection is installed, the terrain, the temperature, and the wind conditions.

**Off-site:** means not occurring on the premises licensed as a landfill site under the POEO Act.

**Percolation:** the passage of water through a particular layer in the landfill (e.g. the flow of rainwater infiltration through a cap down into the waste).

**Permeability:** a property of a material such as soil or rock that is a measure of the ability of that material to allow fluids to pass through it.

**Pollution:** water pollution, air pollution, noise pollution or land pollution.

**Public register:** the public register under section 308 of the POEO Act is an online searchable database and contains:

- licences
- applications for new licences and to transfer or vary existing licences
- environment protection and noise control notices
- convictions in prosecutions under the POEO Act
- results of civil proceedings
- licence review information (submissions regarding licence review can be made at any time)
- exemptions from the provisions of the POEO Act or regulations
- approvals granted under clause 9 of the POEO (Control of Burning) Regulation
- approvals granted under clause 7A of the POEO (Clean Air) Regulation.

**Putrescible waste:** a type of waste that is characterised by materials that readily decay under standard conditions, emit offensive odours, and attract vermin or other vectors (such as flies, birds and rodents). It includes household waste containing putrescible organics, and food and animal waste. See the *Waste Classification Guidelines* (NSW EPA 2014) for more details.

**Reinjection:** the process of returning leachate to the landfill from which it has been abstracted.

**Restricted solid waste:** waste that is classified as restricted solid waste in accordance with the *Waste Classification Guidelines* (NSW EPA 2014). Restricted solid waste contains higher (up to four times) levels of contaminants than general solid waste (NSW EPA 2016).

**Revegetation:** the planting and growing of vegetation in the final capping and other disturbed areas of the landfill to stabilise the soil against erosion and promote evapotranspiration of rainfall (NSW EPA 2016).

**Risk:** the effect of uncertainty on objectives (AS/NZS ISO 31000:2009).

**Runoff:** the portion of water falling on an area (either precipitation or irrigation water) that drains from the area as surface flow.

**Scheduled activity:** an activity listed in schedule 1 of the POEO Act.

**Stockpile:** any piled storage of waste or other material or processed waste product, whether loose, baled, sorted, and irrespective of storage duration (i.e. temporary or long-term).

**Stormwater runoff:** rainfall runoff from the overall area of a landfill that picks up high sediment loads when it runs over disturbed areas, earthworks, exposed soils and stockpiles. Poorly managed stormwater runoff can contain high levels of total suspended solids, which can adversely affect receiving water bodies. See **Total suspended solids**.

In addition to generating sediment loads, poorly-controlled stormwater can contact waste and generate additional volumes of leachate.

**Surface water:** water that is located in the rivers, creeks, lakes, billabongs, wetlands and dams surrounding a landfill and that could be affected by discharges of contaminated water from the landfill.

**Tipping face:** the area of the landfill where waste is disposed of during daily operations.

**Total suspended solids:** the combined content (in milligrams/litre) of all solid substances suspended in water that can be removed by filtration. At a landfill, both leachate and stormwater runoff often have high levels of suspended solids, typically in the range of 200 to 1,000 milligrams/litre.

Typical levels in eastern Australian rivers are from 10 to 50 milligrams/litre, depending on catchment characteristics.

High levels of total suspended solids can give receiving watercourses a turbid appearance and can affect aquatic ecosystems (see ANZECC 2000, volume 2, section 8.2.1.3).

**Virgin excavated natural material:** material defined in the POEO Act as virgin excavated material (as amended from time to time), which at the time of publication of these guidelines means natural material (such as clay, gravel, sand, soil or rock fines):

a. that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities, and
b. that does not contain any sufidic ores or soils or any other waste,

and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA gazettal notice.

**Waste:** means material defined in the POEO Act as waste (as amended from time to time). For the latest meaning of waste under this Act, see www.legislation.nsw.gov.au.

# References

For a comprehensive list of current environmental management standards and guidance materials in Australia and overseas relevant for the environmental management of landfills in NSW, please refer to Environmental Guidelines: Solid waste landfills (NSW EPA 2016), which is available on the EPA website.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# Appendix: Sites audited

**Table 4 Sites audited**

| Licence number | Licensee | Site name | Permitted wastes* | Annual limit (tonnes) |
|---|---|---|---|---|
| 2552 | Bald Hill Quarry Landfill | Benangaroo and North Ridge Quarries | Putrescible, non-putrescible, tyres, asbestos | 40,000 (total) |
| 5186 | Brandown Pty Ltd | Brandown Pty Ltd | Non-putrescible, tyres, asbestos | Not applicable (NA) |
| 5873 | Lake Macquarie City Council | Awaba Waste Disposal Facility | Putrescible, non-putrescible, tyres, asbestos | NA |
| 5875 | Griffith City Council | Tharbogang Recycling & Waste Disposal Facility | Putrescible, non-putrescible, tyres, asbestos | 100,000 (total) |
| 5882 | Eurobodalla Shire Council | Surf Beach Waste Depot | Putrescible, non-putrescible, tyres, asbestos | NA |
| 5899 | Uralla Shire Council | Uralla Landfill | Putrescible, non-putrescible, tyres, asbestos | NA |
| 5939 | Glen Innes Severn Council | Glen Innes Waste Management Depot | Putrescible, non-putrescible, tyres | NA |
| 5940 | Gunnedah Shire Council | Gunnedah Waste Management Facility | Putrescible, non-putrescible, tyres, asbestos | 50,000 (general), 18,000 (tyres, 18,000 (asbestos) |
| 6004 | City of Lithgow Council | Lithgow Solid Waste Facility | Putrescible, non-putrescible, tyres, asbestos | NA |
| 6058 | Dubbo Regional Council | Whylandra Waste Disposal Depot | Putrescible, non-putrescible, tyres, asbestos | 100,000 (total) |
| 6121 | Cessnock City Council | Cessnock Waste and Reuse Centre | Putrescible, non-putrescible, tyres, asbestos | 60,000 (total) |
| 6180 | Blayney Shire Council | Blayney Waste Disposal Depot | Putrescible, non-putrescible, asbestos | 20,000 (total) |
| 6262 | Mid-Coast Council | Taree Waste Management Facility | Putrescible, non-putrescible, tyres | 50,000 (total) |
| 6269 | Kempsey Shire Council | Kempsey Landfill Site | Putrescible, non-putrescible, tyres, asbestos | 25,000 (total) |
| 10398 | Hi-Quality Waste Management Pty Ltd | Minda Landfill | Non-putrescible, tyres, asbestos | 120,000 (total) |

| Licence number | Licensee | Site name | Permitted wastes* | Annual limit (tonnes) |
|---|---|---|---|---|
| 11189 | Port Macquarie Hastings Council | Cairncross Waste Management Facility | Putrescible, non-putrescible, asbestos | 100,000 (total) |
| 11436 | Veolia Environmental Services Pty Ltd | Woodlawn Landfill | Putrescible, non-putrescible, tyres, asbestos | 990,000 (total) |
| 13175 | Garry Cullen Sand & Soil Pty Ltd | Benerembah Sand Pit | Non-putrescible, tyres | 7,500 (total), 1,800 (tyres) |
| 13122 | Craig William Burns | Yeronga | Non-putrescible, tyres | 10,000 (total) |
| 13426 | Dial-A-Dump (EC) Pty Ltd | Genesis Facility | Putrescible, non-putrescible, asbestos | 700,000 (total) |
| 20148 | Bega Valley Shire Council | Bega Valley Shire Council Central Waste Facility | Putrescible, non-putrescible, tyres, asbestos | 100,000 (total) |

* **Putrescible**: General solid waste (putrescible). **Non-putrescible**: General solid waste (non-putrescible). **Asbestos**: asbestos waste. **Tyres**: waste tyres.