LANDFILLS

RESPONSIBLE MANAGEMENT OF OUR LANDFILL SITES

SITA AUSTRALIA AIMS TO MAXIMISE THE VOLUME OF WASTE THAT IS SENT FOR RECYCLING AND RESOURCE RECOVERY. HOWEVER WHEN WASTE CANNOT BE RECOVERED, IT MUST BE TREATED AND DISPOSED OF UNDER ACCEPTABLE ENVIRONMENTAL CONDITIONS.

THE LEADER IN RESOURCE RECOVERY

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SITA IS COMMITTED TO ENSURING AN **ENVIRONMENTALLY SUSTAINABLE FUTURE** BY TAKING A LEADERSHIP ROLE IN RESPONSIBLE LANDFILL MANAGEMENT. WE OWN AND OPERATE **SEVEN ENGINEERED LANDFILLS** ACROSS AUSTRALIA. OUR LANDFILL OPERATIONS ARE CAREFULLY DESIGNED TO MINIMISE THE AMOUNT OF SPACE CONSUMED AND TO MAXIMISE THE OPERATIONAL LIFE OF OUR SITES.

OUR ENGINEERED LANDFILLS ARE ENVIRONMENTALLY SOUND, SECURE AND RESPONSIBLY MAINTAINED. USING THE LATEST TECHNOLOGY AND DRAWING ON OUR INTERNATIONAL ENGINEERING EXPERIENCE, SITA PROVIDES THE **WORLD'S MOST TECHNICALLY ADVANCED**, ENGINEERED LANDFILLS THAT ENSURE THE SAFE STORAGE AND DEGRADATION OF WASTE. WE EMPLOY **ADVANCED MONITORING SYSTEMS** AND OUR **ENGINEERED DESIGNS** ENCOMPASS A VARIETY OF SAFEGUARDS INCLUDING LINER SYSTEMS, LEACHATE COLLECTION, GROUND AND SURFACE WATER MANAGEMENT AND MONITORING, LANDFILL GAS MANAGEMENT, AND LITTER CONTROL.

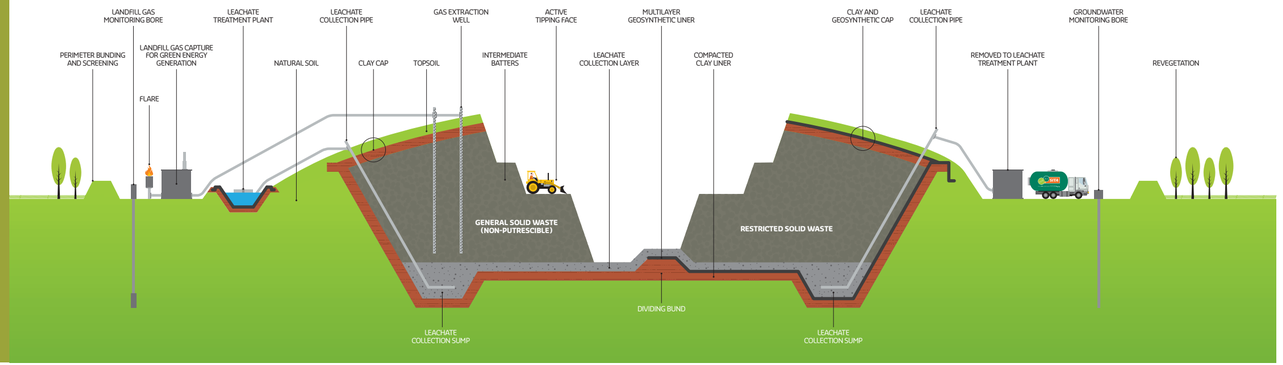
WHAT IS A LANDFILL?

LANDFILLS ARE DESIGNED AND ENGINEERED TO **RECEIVE WASTE**, **CAPTURE BIOGAS** AND **COLLECT LEACHATE**.

Natural geological barriers such as clay or a combination of clay and High Density Polyethylene (HDPE) are used to line the landfill depending on the geological conditions or the type of waste received, before any waste is deposited. This prevents leachate from leaking into ground water and the surrounding area.

When the landfill is full, it is capped with a final cover that consists of many layers. The base of the final cover is clay, which stops water from seeping into the waste and reduces the amount of biogas escaping into the atmosphere. Low Density Polyethylene Plastic and Geofabric layers can also be used as part of the capping. The final layer is made of sandy or gravelly soil and topsoil. The topsoil allows vegetation to take root and grow, stabilising the layers of cover.

SITA'S APPROACH TO ENGINEERED LANDFILLS



WHAT HAPPENS AT OUR LANDFILLS?

Waste is delivered to our landfills either from our transfer stations and resource recovery centres or directly from kerbside collection, commercial customers or the general public.

The waste is unloaded by the trucks then pushed to the active tipping face area by bulldozers where it is squashed by a compactor to reduce the amount of space that it takes up. At the end of the day 150 - 300mm of virgin excavated natural material (VENM) or other material known as 'alternative daily cover' (ADC) is used to cover the waste. This cover is for health and safety reasons as it helps to control odour, reduce litter and prevent scavengers such as rodents, ibis and pelicans from going through the waste.

At all our landfill sites we have sophisticated gas and leachate collection systems in place to minimise the environmental impact on the surrounding area.

WHAT IS LEACHATE AND HOW IS IT TREATED?

Leachate is the liquid that has filtered through the layers of waste deposited in the landfill. It is made up of rainwater and the liquid produced during the breakdown of waste.

Gravity fed leachate drainage and collection systems are installed throughout the landfill. The leachate is collected in leachate sumps before being pumped to a leachate treatment plant, where it is treated biologically. At some of our landfills the leachate is treated onsite at a leachate treatment plant. At other sites, the leachate is collected and transported offsite for treatment.

Biological treatment uses micro-organisms to break down the ammonia in the leachate. This process turns the ammonia into less harmful chemicals such as nitrite and nitrate. The treated leachate can then be safely discharged into the sewer where other types of bugs turn the nitrite and nitrate into nitrogen gas. Nitrogen gas makes up approximately 70% of the air we breathe and it is safe for the environment.

WHAT IS BIOGAS AND HOW IS IT CONVERTED INTO GREEN ELECTRICITY?

Biogas is the term used to describe the gas produced when organic waste breaks down in the landfill without oxygen (anaerobic). It is made up of about 50% carbon dioxide and 50% methane. Hydrogen sulphide, water vapour and other organic compounds are also found in biogas but only in very small quantities. Both carbon dioxide and methane are odourless but hydrogen sulphide is not.

SITA has developed an in-house program to monitor landfill gases and odour. This program uses special equipment to accurately pinpoint odour sources at the landfill sites. The high level of accuracy of the data collected means that odour sources can be quickly identified and action taken to deal with the cause of the problem.

Biogas is collected in gas wells and continuously drawn to an electricity plant under a slight vacuum. At our onsite electricity plants the biogas is processed to remove water and fine particles before it is burnt in a flare or converted into electricity in a landfill gas powered engine or turbine. The basic principle governing this process is turning mechanical energy into electrical energy. The heat and gases produced from burning the biogas spins the turbine or generator to produce electricity. Any excess biogas that can't be turned into electricity is burnt in flares and produces carbon dioxide and water.

Burning biogas reduces the greenhouse impact of landfill gas, as carbon dioxide is a less potent greenhouse gas than methane.

MONITORING AND REPORTING

SITA employs a rigorous monitoring and reporting regime for the various aspects of our landfill operations.

Our sites have a series of monitoring systems installed including: groundwater monitoring bores, gas monitoring bores, leachate sumps and dust gauges. These systems are regularly checked internally and are annually assessed by an independent, third-party environmental auditor.

GROUNDWATER

Groundwater monitoring bores are monitored and sampled for a wide range of organic and inorganic parameters. The results are reviewed after every monitoring period and collated for annual environmental reporting. In some states, an independent Environmental Auditor appointed under the Environment Protection Act 1970 also reviews and reports on groundwater risks.

LEACHATE

Leachate sampling results are reviewed after each monitoring period and reported annually. Monitoring of leachate also occurs within the leachate treatment plants for review of their performance.

LANDFILL GAS

Landfill Gas (LFG) quality, quantity and flow is monitored within the LFG extraction systems via gas wells. The extraction systems are adjusted and balanced to yield the best performance from the gas field.

Furthermore, surface gas levels and perimeter gas monitoring probes are monitored for parameters listed within the sites EPA licence.

SURFACE WATER

Surface water collected, including groundwater extracted from the sites is tested and must comply with the limits and parameters listed within SITA's licence before it can be released to the environment. Surface water monitoring is also reported annually.

POST CLOSURE

Monitoring and reporting of groundwater, leachate and landfill gas continues throughout the post closure care period. This period is approximately some thirty years after the site has closed for the receipt of waste.

WHAT HAPPENS AFTER THE LANDFILL CLOSES?

SITA is committed to the long term care of all our closed landfills through ongoing monitoring, leachate treatment, storm water treatment and gas collection.

After closure all of our landfill sites are revegetated with native plants. The rehabilitated land is often used for community recreation such as sporting facilities or parklands and can become an asset to local communities.

SITA TAKES LONG-TERM RESPONSIBILITY FOR ITS LANDFILL SITES.

SITA'S ENGINEERED LANDFILLS

SITA IS COMMITTED TO ENSURING AN **ENVIRONMENTALLY SUSTAINABLE FUTURE** BY TAKING A LEADERSHIP ROLE IN RESPONSIBLE LANDFILL MANAGEMENT. WE OWN **AND OPERATE 7 ENGINEERED LANDFILLS** ACROSS AUSTRALIA.

DID YOU KNOW?

SITA is Australia's largest producer of landfill biogas used for the production of renewable energy. Between July 2010 and June 2011, SITA's landfills captured enough biogas to generate 36,700Mwh of renewable energy, representing a greenhouse gas reduction of over 1 million tCO2-e. This is equivalent to the power requirements of approximately 37,510 homes.

LOCATION	TYPE	SIZE	MATERIAL ACCEPTED	
Elizabeth Drive Kemps Creek NSW	Non-putrescible	65 ha	Solid non-putrescible, commercial and industrial (C&I) waste, construction and demolition (C&D) waste, and restricted waste.	
New Illawarra Road Lucas Heights NSW	Putrescible	125 ha	Solid putrescible and non-putrescible waste, including C&I and C&D waste.	
Newline Road Raymond Terrace NSW	Non-putrescible	30 ha	Solid non-putrescible, C&I and C&D waste.	
Richardson Road Spring Farm NSW	Non-putrescible	21 ha	Solid non-putrescible, C&I and C&D waste.	
Hallam Road Hampton Park VIC	Putrescible	50 ha	Solid putrescible and non-putrescible waste, including domestic, C&I and C&D waste.	
Taylors Road Dandenong South VIC	Putrescible	56 ha	Solid putrescible and non-putrescible waste, including domestic, C&I and C&D waste, and prescribed industrial waste.	
Shale Road South Cardup WA	Putrescible	18 ha	Solid putrescible and non-putrescible waste, including domestic, C&I and C&D waste.	

SITA RECOGNISES THAT LANDFILLING PLAYS AN **INTEGRAL AND NECESSARY ROLE** IN MANAGING THE WASTE GENERATED BY OUR CUSTOMERS. SECURE, ENGINEERED LANDFILLS ARE THE **BEST ENVIRONMENTAL OPTION** TO DISPOSE OF WASTE THAT CANNOT YET BE RECYCLED OR REUSED.

CONTINUING TO DISPOSE OF UNTREATED WASTE IN LANDFILLS IS NOT THE BEST LONG-TERM OPTION BECAUSE THE RESOURCES IN THE WASTE ARE LOST AND OTHER **MORE SUSTAINABLE** WAYS OF MANAGING WASTE ARE NOW AVAILABLE.

TURNING WASTE INTO **VALUABLE RESOURCES** IS A PRIORITY FOR SITA AND WE OFFER A RANGE OF **RESOURCE RECOVERY SOLUTIONS** TO MANAGE THIS RAW MATERIAL SUSTAINABLY.

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THE LEADER IN RESOURCE RECOVERY

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EASTERN CREEK RESOURCE RECOVERY PARK

SITA'S EASTERN CREEK RESOURCE RECOVERY PARK IS HOME TO A NUMBER OF **RECYCLING, RESOURCE RECOVERY AND WASTE MANAGEMENT INITIATIVES**.

- An **Organic Resource Recovery Facility**, which processes shredded organic material in open-air compost windrows, enabling careful control of moisture and temperature. Naturally-occuring micro-organisms digest the organic material, leaving behind nutrient-rich compost which can be used in a variety of different soil conditioners and growing media.
- An **Advanced Resource Recovery Technology (ARRT) Facility**, operated for SITA by Global Renewables, which separates and composts organic material from household garbage placed in red-lidded bins. Recyclables found in the garbage are also recovered.
- A **Service Centre** for SITA's collection fleet and machinery used on site. All of SITA's plant equipment at Eastern Creek use Soybiodiesel fuel, a cleaner-burning alternative diesel fuel produced from virgin soybean oil.
- A public **transfer station** that accepts recyclables from the local community to encourage diversion from landfill.
- A best practice **engineered landfill** operated by the NSW Government Waste Assets Management Corporation, which provides responsible environmental management of waste that cannot be reused or recycled.

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THE LEADER IN RESOURCE RECOVERY

WALLGROVE ROAD LANDFILL

WASTE MANAGEMENT HAS CHANGED CONSIDERABLY OVER THE LAST DECADE. SITA RECOGNISES THAT LANDFILL PLAYS AN **IMPORTANT AND NECESSARY PART** IN MANAGING AUSTRALIA'S WASTE DISPOSAL NEEDS UNDER CAREFULLY MANAGED CONDITIONS.

Wallgrove Road Landfill is located in Eastern Creek, about 37km west of the Sydney CBD.

It provides many nearby communities with an essential civil service using a **best practice environmental management solution** for those wastes that cannot yet be recycled or reused, in compliance with current EPA Licence and Works Approval.

Wallgrove Road Landfill only accepts **non-hazardous waste**, and is operated by the NSW Government's Waste Assets Management Corporation (WAMC).

The management and operation of the landfill is designed to ensure it has **minimal impact** on neighbours and the surrounding environment.

The Wallgrove Road site has a series of monitoring systems installed including **groundwater monitoring bores, gas monitoring bores and leachate sumps**. These systems are regularly checked internally and are annually assessed by an independent, third-party environmental auditor.

Certified System™
Environment
ISO 14001

Certified System™
Health & Safety
AS 4801

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THE LEADER IN RESOURCE RECOVERY

GREEN POWER

THE **WALLGROVE ROAD LANDFILL** FEATURES GAS ENGINES WHICH ARE CAPABLE OF PRODUCING ELECTRICITY FOR USE BY HOMES IN THE SURROUNDING COMMUNITY. SIMILAR SYSTEMS USED AT SITA'S OTHER NSW LANDFILLS ARE CAPABLE OF PRODUCING ENOUGH POWER FOR THE EQUIVALENT OF OVER **21,000 HOMES***.

In landfills, organic waste breaks down naturally to produce a mixture of gases which is largely composed of methane.

While methane is a greenhouse gas, it can also be used in **specialised generators** to **produce electricity**. The landfill has systems and infrastructure in place to allow renewable energy to be produced on-site.

Landfill gas is extracted through a series of pipes and cleaned to harvest the methane, which is transferred to on-site electricity plants as fuel. The power generated is returned to the grid as **renewable energy** to provide electricity to households.

It takes a certain amount of gas in order to run a generator, and until gas production reaches this level, the smaller amounts of gas produced initially are normally **burnt off** or **'flared'** to reduce off-site odours and control gas emissions.

Our ongoing investment in **landfill gas capture** technology has seen an increase in the production of renewable energy from our sites, providing significant environmental benefits by reducing greenhouse gas emissions and reliance on fossil fuels for power generation.

*Maximum generating capacity of engines. Based on average annual household energy usage of 7,300kWh (NSW Office of Environment & Heritage).

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THE LEADER IN RESOURCE RECOVERY

SITA AUSTRALIA IS THE LEADER IN SUSTAINABLE RESOURCE RECOVERY MANAGEMENT.

WITH OVER **2,100** EMPLOYEES AND CONTRACTORS, **850** COLLECTION VEHICLES AND **100** OPERATIONS ACROSS AUSTRALIA, WE RECOVER VALUABLE RESOURCES FOR **RECYCLING AND REUSE.**

SITA PROVIDES THESE SERVICES TO MORE THAN **56,000** COMMERCIAL AND INDUSTRIAL CUSTOMERS AND MORE THAN **3.7 MILLION** RESIDENTS EACH WEEK.

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THE LEADER IN RESOURCE RECOVERY

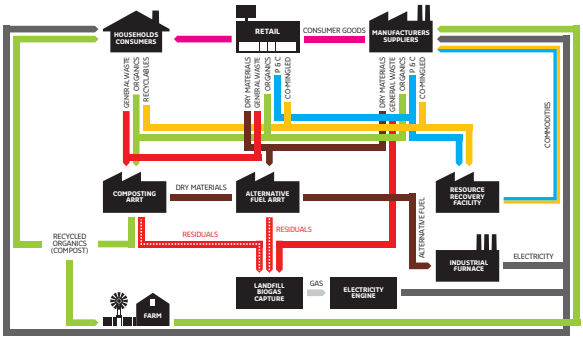
RESOURCE RECOVERY

SITA IS COMMITTED TO IMPLEMENTING EFFECTIVE, EFFICIENT AND ENVIRONMENTALLY SUSTAINABLE SOLUTIONS TO **RECYCLE AND RECOVER RESOURCES** FROM ALL WASTE STREAMS.

Recyclable materials are sorted into **usable commodities** and turned into new products:

- **garden** and **food organics** become **compost**,which is used in the production of foods that end up back on the supermarket shelf
- **biogas** generated from organic material sent to landfill is captured and **converted to electricity**
- paper, cardboard, plastic and glass are **recovered** and **reused** into products such as newspapers and plastic bottles
- unwanted **building material** is ground and becomes quality base for the construction of roads, car parks and community areas
- textiles and mixed plastics separated from general waste are manufactured into **alternative fuels** and used as a replacement for coal or gas to generate power

SITA's philosophy is to **close the loop** – so that the things you throw away today become useful again tomorrow.



SITA's integrated sustainable resource recovery solutions

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THE LEADER IN RESOURCE RECOVERY

TRANSFORMING ORGANICS INTO VALUABLE RESOURCES

SITA ORGANICS PROVIDES **HIGH QUALITY PRODUCTS AND SERVICES FOR SUSTAINABLE SOIL MANAGEMENT** TO HOME GARDENERS, LOCAL COUNCILS, AND CUSTOMERS IN HORTICULTURE, AGRICULTURE, VITICULTURE, MINING, CIVIL WORKS AND COMMERCIAL LANDSCAPING.

SITA Organics

We are the largest processor of urban-generated food and garden organics in Australia, producing around **500,000 tonnes** of high-quality compost every year.

By returning organic matter, carbon and essential nutrients to the soil, SITA Organics contributes to a **sustainable future** for Australia's fragile soil systems.

DID YOU KNOW? Organic waste includes any **animal or plant based material** and degradable carbon such as garden organics, food, timber, paper and cardboard. When sent to landfill the organic material undergoes anaerobic decomposition, generating a **potent greenhouse gas** called methane.

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THE LEADER IN RESOURCE RECOVERY

COMMUNITY ENGAGEMENT & EDUCATION

THE PROVISION OF **ESSENTIAL, DAILY ENVIRONMENTAL SOLUTIONS** TO COMMUNITIES, INDIVIDUALS, BUSINESSES AND ORGANISATIONS IN THEIR CHOICE TO LIVE AND OPERATE SUSTAINABLY IS WHAT WE DO.

Recognising that our operations affect the lives of many Australians, we are committed to **working with the communities** in which we operate to provide regular and easily accessible information about our sustainable resource recovery, recycling and waste management activities.

We maintain an **active dialogue** with our communities, environmental champions and representatives of government, business and industry. We value different perspectives and are keen to share our knowledge to help build a consensus for positive change.

To support this commitment, SITA operates a number of dedicated Education Centres for **schools, community groups and businesses** interested in learning more about recycling, resource recovery and sustainable environment practices.

Our community engagement activities also extend to:

- SITA Environmental Report Hotline – 1800 368 737
- Community Reference Groups across Australia
- Education programs on-site, in schools and in the community
- Sponsorship and partnership activities with local communities and commercial ventures
- A dedicated website – sita.com.au

THE LEADER IN RESOURCE RECOVERY

ENGINEERED LANDFILLS

SITA AIMS TO MAXIMISE THE VOLUME OF WASTE THAT IS SENT FOR RECYCLING AND RESOURCE RECOVERY. HOWEVER, WHEN HAZARDOUS OR NON-HAZARDOUS WASTE CANNOT BE RECOVERED, **IT MUST BE TREATED AND DISPOSED OF UNDER ACCEPTABLE ENVIRONMENTAL CONDITIONS**.

At SITA our highly engineered landfills are divided into areas called **cells**.

Before a cell can be filled with commercial and residential waste, it must be installed with many protective layers. These consist of:

- 900mm of compacted clay.
- Perforated pipes (to capture liquid) which are laid down within a layer of crushed rock.
- For restricted waste cells (for example at SITA's Elizabeth Drive Landfill), additional layers of geosynthetic clay lining and thick HDPE plastic are added.

The cell is then ready to receive waste. When a cell reaches its full height it is then **capped** using compacted clay, crushed rock and soil, with an additional layer of geosynthetic clay liner used in restricted waste cells.

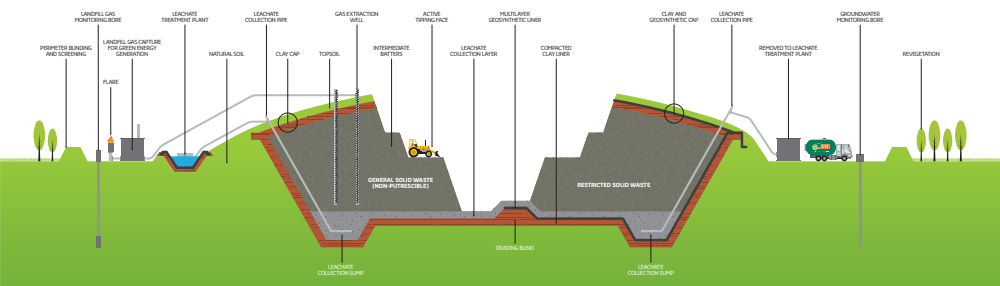
Leachate (the wastewater generated within the landfill) is pumped out of the cell and into a Leachate Treatment Plant. It is then treated on-site using aeration before being responsibly discharged into the sewer system in compliance with a Trade Waste Agreement.

A system of pipe work is installed to extract the landfill gas and create **green power**.

After the cell is capped it is then revegetated using local plants and grasses.

Rejuvenated landfills are often turned into public parks and gardens, golf courses or bike tracks.

SITA'S APPROACH TO ENGINEERED LANDFILLS



THE LEADER IN RESOURCE RECOVERY

EASTERN CREEK ORGANIC RESOURCE RECOVERY FACILITY

SITA AUSTRALIA'S EASTERN CREEK ORGANIC RESOURCE RECOVERY FACILITY IS HELPING THE NSW COMMUNITY BY **DIVERTING ORGANICS FROM LANDFILL** AND RECOVERING VALUABLE RESOURCES FOR HEALTHY PLANT GROWTH.

SITA Organics

Garden-ARRT™ Lawn-ARRT™ Vine-ARRT™ Fruit-ARRT™ Veggie-ARRT™

Our Eastern Creek facility uses **open windrow composting** to transform lawn clippings, leaves, branches and other garden organics, as well as organic material such as grease trap waste from restaurants and super markets, into high-quality compost products.

From Waste to Resource

- Once the organic material is received from council and commercial collections, all contaminants such as plastic bags, bottles and metals are removed.
- The organics are then ground into a smaller, more suitable size for composting.
- This material is placed in open windrows to decompose naturally with the help of the same micro-organisms found in any home compost bin. The composting process is aerobic, meaning the material breaks down in the presence of oxygen. A windrow turner mixes it with air to ensure even pasteurisation.
- Over the composting period the organic product is closely monitored for moisture, temperature and bulk density.
- When decomposition is complete, the material is screened into a variety of high-quality compost and soil blends.

SITA Organics products are produced in accordance with **Australian Standard AS4454** – composts, soil conditioners and mulches. A number of products are also certified to either **AS4454** or **AS4419**.

The finished products can be used for many purposes including lawns, sporting fields, garden beds, vineyards, fruit orchards and pastures.

CERTIFIED COMPOST

Certified Product™

Australian Standard AS 4454 Lic SMKC02698

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LAND REHABILITATION AND REUSE

ONCE A LANDFILL REACHES CAPACITY, THE SITE MUST BE RETURNED TO AN ACCEPTABLE CONDITION WHILE **ONGOING MONITORING AND MAINTENANCE** CONTINUES. MANY FORMER LANDFILL SITES HAVE BEEN TURNED INTO NEW FACILITIES WHICH PROVIDE **RECREATIONAL OPPORTUNITIES** FOR LOCAL COMMUNITIES.

When organic material breaks down in a landfill, potent greenhouse gases are produced. These gases are extracted, treated and used to fuel generators which export **renewable energy** into the NSW electricity grid.

After the last load is buried in a landfill, these gases can continue to be generated for up to **30 years**. This means a landfill can be a valuable source of renewable energy for a long time after it reaches capacity!

The liquid (called **leachate**) which accumulates in the drainage layers must also be pumped out and treated until the concentration of ammonia and other chemicals reaches a safe level.

Even though this ongoing care may have to continue for many years, the surface of the landfill can still be **rehabilitated** in the meantime. By adding extra fill, capping with soil and compost, and revegetating the surface using **local native trees and shrubs**, many landfills have been returned to use as parkland for recreational use, or even top class sporting facilities including netball or soccer fields, athletics tracks, and golf courses.

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THE LEADER IN RESOURCE RECOVERY

THE **FACTS** ABOUT

THE LEADER IN RESOURCE RECOVERY

GARDEN AND FOOD ORGANICS

ORGANIC WASTE INCLUDES ANY **ANIMAL OR PLANT BASED MATERIAL** AND DEGRADABLE CARBON SUCH AS GARDEN ORGANICS, FOOD, TIMBER, PAPER AND CARDBOARD. WHEN SENT TO LANDFILL THE ORGANIC MATERIAL UNDERGOES ANAEROBIC DECOMPOSITION, GENERATING A **POTENT GREENHOUSE GAS**, METHANE.

2 The **second largest** source of methane in Australian landfills is food organics.

Mulched or composted garden and food organics are a valuable **nutrient dense material** that can be used to create and maintain a healthy garden.

Temperatures generated by the composting process **destroy any pathogens and weeds** in the raw materials.

56

56 litres of water is saved for every kilogram of food that is recovered.

Composting your garden and food organics and using it on your garden significantly increases the soil's **ability to retain water**.

About **two thirds** of all waste sent to landfill in Australia consists of food organics.

Gases produced in landfill from garden and food organics continue to be generated for at least **15 to 30 years**.

25

Organic materials decompose in landfill to form greenhouse gases including methane, which has a global warming potential **25 times higher** than carbon dioxide.

THE **FACTS** ABOUT

GARDEN AND FOOD ORGANICS

THE LEADER IN RESOURCE RECOVERY

WHAT HAPPENS TO ORGANICS?

1 COLLECTION

Garden and food organics are collected from homes and businesses, and sent to an Organic Resource Recovery Facility.

2 DECONTAMINATION

Contaminants such as steel, plastic, glass, bricks and general waste are manually removed.

3 SHREDDING AND STACKING

The remaining organic material is shredded into smaller pieces and stacked in windrows. These are kept moist and turned regularly over a period of 16-20 weeks.

4 COMPOSTING

Micro-organisms break down the material and heat is generated, destroying weeds and pathogens. Temperatures can range between 50˚C and 70˚C. Laboratory testing ensures that compost complies with stringent standards.

5 SCREENING AND GRADING

Compost is screened into required sizes. Different grades of compost are required for different applications.

6 RECYCLED ORGANICS

The final product is ready to be used in horticulture, agriculture, landscaping, garden centres, rehabilitation and other end markets, returning nutrients and essential minerals to the soil and improving plant growth.

**Organic waste falls into two categories for treatment, depending on whether or not it contains food waste. Garden Organics often uses Open Windrow Composting. In-Vessel composting is used for organic material that includes food.*

Sources: OzHarvest, Zero Waste, and The Department of Sustainability, Environment, Water, Population and Communities

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SITA – Waste Management

1. Which materials can be recycled and which are designated for landfill? Complete the table below.

Recyclable	Landfill

2. What happens to the materials that are recycled?

_____

_____

3. What happens to the materials that reach landfill?

_____

_____

4. Why does the facility have a plant nursery? What is the purpose of this?

_____

_____

_____

_____

_____

5. Gas is collected from the decomposing landfill. Describe this process and the uses of the gas.

_____

_____

_____

_____

_____

_____

_____

6. Describe the landfill area. (rubbish, smell, unusual things, wildlife, insects, machinery)

_____

_____

_____

_____

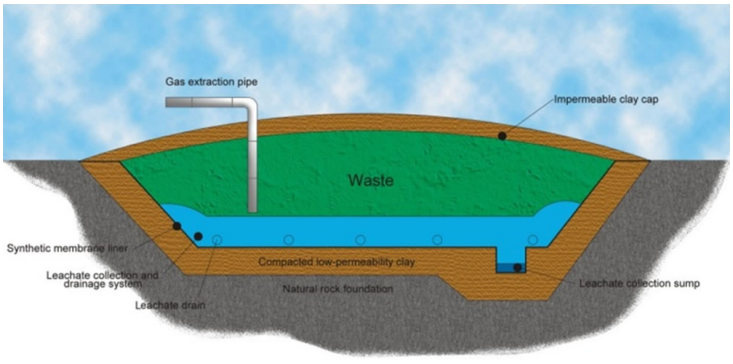

Diagram of a typically landfill site.

www.ukhydrogeologist.co.uk

Waste Management Facilities

In order to learn new terms, definitions can be looked up online or in a dictionary. The easiest way to look at a definition through the search engine Google, is to write the word 'define' followed by the word you wish to look up.

1. Define the following terms

a. Waste Management:

_____

_____

_____

b. Recycle:

_____

c. Landfill:

_____

_____

Website:
http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0~2010~Chapter~Landfill%20%286.6.4%29

Australian Statistics on Waste Management

2. Fill in the blanks:

Australia has a strong dependence on _____ as a form of waste management. The majority of _____ that is not recycled or re-used in Australia is disposed of in the nation's landfills.

Landfills can impact on air, _____ and land quality. Landfill gas, mainly _____, is produced by decomposing organic waste which contributes to _____ _____ when released to the air. Water moving from, or through, landfill waste forms leachate which has the potential to contaminate nearby surface and ground water. Potentially _____ substances can also migrate through the surrounding soil via leachate or landfill gas.

Between 2001 and 2007, the volume of waste deposited to landfill increased by _____ . In 2001, 19.0 million tonnes of waste were disposed to landfill, and by _____ this had grown to more than _____ tonnes.

Other indicators show that during 2006–07, nearly _____ (48%) of all waste was disposed to landfill. _____ 60% of municipal waste, 44% of commercial and industrial waste, and 42% of construction and demolition waste went into landfill in 2006–07 (EPHC 2009).

Increases in Australia's _____ and per capita income over the period are likely to have _____ to the rise in waste production. This is due to the link between waste production and _____ growth, whereby more waste is produced through the increased production and _____ of goods and services. In 2007-08, there were 31.7 million new _____, computers and computer products sold in _____. A further 16.8 million units reached the end of their life that year, and of these, _____ were disposed to landfill (Hyder Consulting and PricewaterhouseCoopers 2009).

Website: http://www.sita.com.au/community-education/site-tours-education/fact-sheets/

3. View the facts sheets on the site above and answer the questions below.

a. Fill in the table below:

Recycled Material	Amount Used Each Year	Amount Recycled Each Year
Steel and Aluminium		
Paper and Cardboard		
Plastic		

b. Click on the Glass fact sheet. How long does it take for glass to break down in landfill if it is not recycled?

_____

c. What percentage of new jars are made up from recycled ones? _____

d. Click on the E-Waste fact sheet. Name the toxic materials found in electronic waste.

_____

e. How many printer cartridges are thrown away each year? _____

d. Name at least 4 devices that make up E-Waste. _____

Website: http://www.sita.com.au/commercial-solutions/resource-recovery-recycling/container-recycling/

4. Scroll down to the Acceptance Criteria and fill in the table below.

Accepted	Not Accepted

Website: http://www.sita.com.au/media/publications/121011-landfills_6pp_Final_Web_VersionLandfills_6pp.pdf

5 Fill in the questions below based on the facts in the pdf.

a. What is Biogas and how is it converted into energy?

_____

_____

_____

_____

b. What occurs after the closure of a landfill site?

_____

_____

_____

c. Draw a diagram of an engineered land fill site. Remember to have a heading and use labels.