

Part 1 - Background

What is Waste?

'Waste' is something we think we no longer have a use for, or which has no purpose – from our human perspective.

Nearly every activity generates waste of one form or another. Whether something is broken, unwanted, left over, useless, scrap, empty or broken, when thrown away it is 'waste'.

When we throw something away, although we can no longer see it, the material still exists. All waste intended for landfill is tipped into a hole in the ground, which has been lined to seal it off from groundwater and is later covered with clay (a 'managed landfill').

Other options exist for managing waste, which include incineration, but this creates by-products in the form of toxic ash, gases and heat, each of which needs to be managed.

Alternatively, we can manage 'waste' through the waste hierarchy – first **reduce**, then **re-use** and then **recycle or recover** (materials and energy). This enables us to find alternative uses for it, but it should be remembered, we will never entirely eliminate waste, so we need to **rethink** our options, making use of new technologies and legislation.

Waste Today in our District/City

Waste comes from a range of sources including households, businesses, schools, construction sites and litter bins. The majority of waste is managed by the District or Unitary Council through kerbside collections and deliveries at transfer stations.

For recent waste and recycling tonnages for our District, visit your Council's website and follow the waste and recycling link.

The Cost of Waste

The cost of landfilling waste is continually rising. Waste disposal is funded in several ways:

1. Transfer Station gate fees. To dispose of waste (and *some* particular recycling, such as TV sets and vehicle tyres), there will be a charge made to users of the transfer stations, depending on the waste type and quantity. This charge incorporates transfer station operating costs, transportation, disposal or processing and the landfill waste levy (see below).

2. User-pays refuse bags or wheelie bins. To have waste collected as part of Council's kerbside collection service, Council refuse bags or bins must be used, paying for which assists with funding the provision of the service.
3. Rates on property. The emptying of the Council's street litter bins, and clearing up occasional fly-tipping, is funded via the rates.

The Waste Levy

This Levy in 2018 is \$10 imposed on every tonne of household rubbish dumped at 45 managed landfills around the country, but 381 other private landfills are exempt from the levy. It has raised \$192m for the government from 2010 to 2016 – of which \$46m has gone to councils and \$40.9m nationally to 66 projects aimed at reducing waste. Local Government has lobbied for the rate to be raised and that it be extended to more sites, which looks possible for 2019.

The Problem of Waste

It is an Unnecessary Waste of Resources.

To produce things such as cans, glass and paper uses mined mineral resources, often sourced from beyond New Zealand or timber products, from trees which have taken over 25 years to grow.

To extract resources also consumes energy, water and produces waste, so to lower the demand on the Earth's diminishing resources, we need to reduce waste by reusing and recycling.

Recycling waste saves energy in comparison to making new products from raw materials. For example, recycling of aluminium cans saves 95% of the energy required to make the same amount of aluminium from bauxite, its mineral source. One ton of recycled aluminium saves 14,000 kilowatt hours (Kwh) of energy, 40 barrels of oil, and 9 cubic metres of landfill space.

Possible Pollution from Landfills

Landfills create at least two forms of pollution:

1. **Methane** – a greenhouse gas produced from carbon and hydrogen as the organic content of the landfill rots down without air. Per molecule, it is much more powerful in 'warming effect' than carbon dioxide.

An increase in greenhouse gases could result in weather changes, for example increased flooding from longer or heavier periods of rain. At some landfills the methane produced is flared (burned to create carbon dioxide) and can be used to produce electricity, so causing less impact on the environment.

2. **Leachate** – is the liquid resulting from rainfall entering the landfill and this water penetrating through the compacted waste.

As water soaks through the various levels, soluble or suspended substances from the waste accumulate in this water. To prevent pollution at modern landfills, this leachate is captured and removed from site for treatment as special waste, and the site is capped on top with clay to shed rainwater and reduce infiltration.

Photo: The compactor bin storage pad at Kate Valley managed landfill in North Canterbury. Each of the blue bins fits onto a heavy goods truck, to give an idea of size.



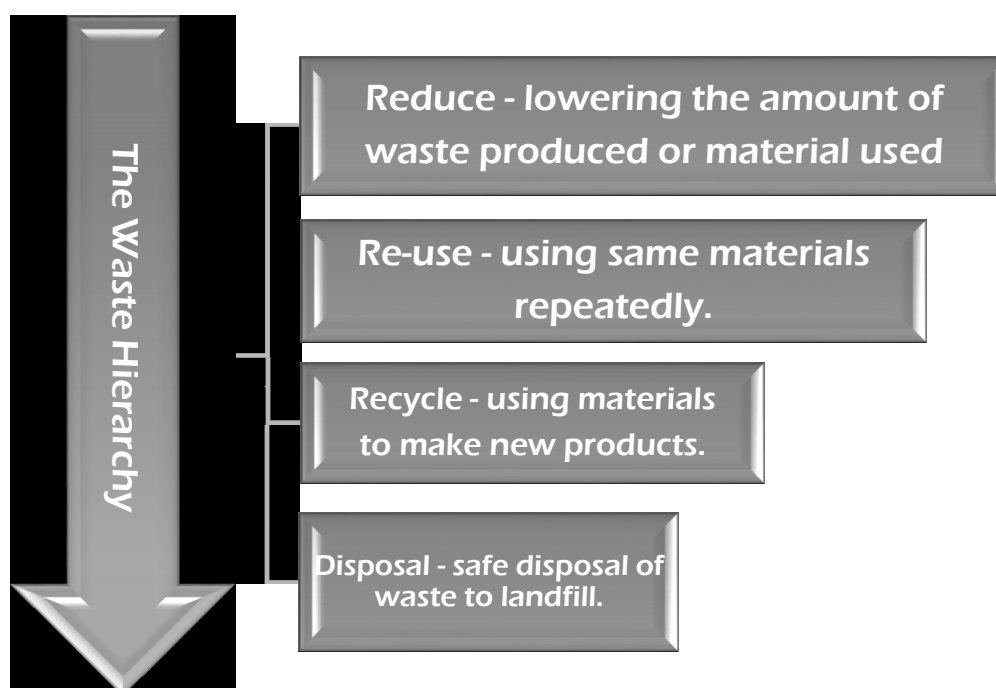
Part two follows, on page 8

Part 2 – The Waste Hierarchy

The level of the waste hierarchy which Council, residents, business and visitors to the District/City can influence the most is **recycling**.

When aiming to minimise waste, people tend to maximise recycling. Although recycling is very important, there are other actions we can implement through following the Waste Hierarchy – the 3 'Rs' – **Reduce, Reuse and Recycle**.

Following the hierarchy assists the conservation of resources, energy and water, as the disposal of waste to landfill is always the last option.



Reduce – lowering the amount of waste produced.

When looking to improve how we manage waste, the first step is to reduce.

This requires behavioural change by re-thinking what we do with things we no longer need and making wise purchasing choices to avoid over packaged products.

Following are some ideas and tips to make a difference to reduce waste at home and school.



Ideas to Reduce Waste at School

- Ensure printers and photocopiers print on both sides of the paper as the default setting, only print e-mails if needed and avoid plastic-laminating paper, as this can't be recycled afterwards. Laminated cards may permit multiple use and save repeat printing, but only if you can reliably file and retrieve them!
- If your school produces a newsletter, where possible e-mail it out and only print the number requested by non-email users.
- Operate a policy of litter-free lunch boxes or ensure waste is taken home.
- Use one paper towel at a time and collect for compost once used.
- Discourage single-use cleaning products e.g. wet wipes.
- Return unwanted new stationery to a central point for others to use and only order what you need. That saves money too.
- Set up a food scraps recycling scheme within the school, using a compost bin, or wormery or bokashi. Compost bins can be built re-using wooden pallets and old carpet (to keep warm in winter), or straw bales and wire netting.

Ideas to reduce waste at home

- Place a 'No Junk Mail' notice on your mail box to reject advertising circulars.
- Do not print emailed bills and circulars unless absolutely necessary.
- Prefer multi-use cloth bags for your shopping, so keep them handy.
- Make wise choices when purchasing items, e.g. fruit and vegetables don't need to be shrink wrapped, or on plastic trays. Reusable bags help when shopping.
- Purchase concentrated items, such as cordial drinks, laundry liquid or dish-wash detergent and fabric softener; and this often has the advantage of being cheaper than ready-diluted versions.
- Repair items rather than throwing them away and delay purchasing new. Fashion clothing is especially wasteful if you hardly ever wear it. Share with family/friends.

Suggested Activity

Waste Reduction - Litter Free Lunches

One way to reduce school waste is through litter free lunches. To change behaviour and see the impact of such a policy, begin by measuring the waste generated. This activity involves looking at the types of packaging in lunchboxes. Food sometimes needs packaging to keep it fresh and intact, but much of the packaging goes straight in the bin; it is this aspect you are working to change.

Step One – Choose a lunch time to collect the left over rubbish and once accumulated separate the compostable waste e.g. fruit left-overs. Ensure only reusable containers and drink bottles are left in the lunchboxes.

Step Two - Weigh the compostable waste, this can be collected in a box to make it easier to handle.

It is also a great opportunity to note the most common types of food being wasted.

Step Three - Separate the waste which cannot be recycled or composted, which will be sent to landfill, and place it in a bag for weighing. This will tell you the amount of waste that each sampled class (or if you scale it up, the entire school) produces.

Undertake the three steps on several occasions to see the impact on reducing the school's waste and keep a record. This way you will be able to monitor progress.

Send home information via e-mail (save paper where you can) to invite everyone on board and provide guidance on possible lunch packaging to use and avoid. Some suggestions are provided on the next page:

Re-think your lunchbox.



Typical Lunch Packaging

- Food in plastic bags.
- Food wrapped in aluminium foil or plastic film-wrap.
- Tetra-pak™ cartons of milk or juice. (card and plastic films combined, is hard to recycle)
- Wrappers and one use straws from drink cartons
- Convenience food plastic/foil packaging e.g. chips and biscuits.
- Plastic 'disposable' spoons, throw-away paper serviette.

Or: Packaging to Reduce Lunchtime Waste

- Re-usable lidded stiff plastic container, with a secure top.
- Refillable metal or plastic drink bottles, screw-on top. No straws.
- Small re-usable containers for home-made biscuits and cakes.
- Fruit in own skins, compostable apple cores, banana skins and other peelings.
- Re-usable spoons, knives and forks; washable cloth serviette.



Photo: An example of two litter free lunch boxes.

Litter free lunchboxes are easy to achieve and a great way to help the environment and save money.

Re-use – second use of something either in its original form or for another purpose.

Re-use is the second step to implement when minimising waste. Some ideas for reusing products at home and school are suggested below.

Ideas on Re-use at Home

- Unwanted clothing and household items can be donated to charity shops or re-use stores or sold online. Outgrown uniforms could be sold via school?
- Where possible use refillable products e.g. toner cartridges or liquid soap.
- Re-use envelopes by placing labels over previous address details.
- Shred newspaper for animal bedding or to use in compost.
- Use rechargeable NiMH batteries and a mains power charger.
- Re-use plastic carrier bags or preferably only cloth bags as replacement.
- Collect pine cones and tie-up dry cabbage tree leaves to use for firelighters.
- Re-use plant pots for growing seedlings, rather than purchasing new pots.
- Re-use packaging such as polystyrene and starch chips and bubble wrap.
- Refill empty glass jars with homemade jam, chutney and other preserves.
- Compost unwanted food and garden waste (but not animal faeces, unless in commercial scale hot composting).
- Use bread bags in the freezer for storage or in lunchboxes for wrapping.
- Buy re-usable waxed cloths to use as food covers or lunch wraps.

Ideas on Re-use at School

- Re-use yogurt containers for artwork; these make great paint and glue pots.
- Re-use containers and packaging for art and craft activities.
- Have a tray in each classroom and the staff room for scrap one-side-used paper to re-use, for hand written notes or drawing.
- Ensure there are scrap A4 paper trays by printers and photocopiers and know which way up to load paper that's already printed on one side!
- Encourage pupils to use old birthday and Christmas cards for art projects.
- If viable, refill toner cartridges rather than purchasing new ones.
- Ask fabric shops for unwanted material offcuts, to be used for art and craft.
- Rather than send unwanted school furniture to landfill, if in a reusable condition and safety compliant, e-mail other schools or advertise it for sale or gift to charity.
- Encourage staff and pupils to bring in waste free lunches and compost apple cores, banana skins and other leftover food from lunches
- If possible, use re-fillable containers for all cleaning products.
- Set up a drop off point for un-wanted school uniforms, (these could be sold to other pupils or redistributed) and a drop and swap box for items such as folders, text books and stationery, which can be used by others.

Suggested Activity – to re-use waste at School and Home

There are many ways waste can be used to produce something inventive and fun, it just takes some imagination. A couple of suggestions to re-use unwanted wooden pallets or wooden drawers (left), tyres (top right) and threaded plastic bottle tops are shown (below right). See also our Plastics Fact Sheet in Part 3.



Recycle – the reprocessing of used materials into new products to prevent the waste of potentially useful materials.

To minimise the volumes of waste disposed of into landfill and to ensure where possible that value is recovered from waste, your Council is keen to maximise recycling.

Further information on the specific waste and recycling services in this District can be researched in **‘What Happens here’** in part Four.

In addition to the Council’s recycling services, there are other ways you can recycle; some possibilities are suggested on next page:

Ideas for Recycling at home

- Recycle paper, card, cans, plastic bottles and containers using Council's kerbside recycling collection service or deliver them to your nearest transfer station, where you can also recycle your glass bottles.
- Compost organic waste such as fruit and vegetable peelings. Outdoor compost bins can be built or purchased and provide a great free soil conditioner. Cooked food which might include meat or dairy scraps should not go in outdoor compost but can be composted enclosed using a wormery (worm farm container) or EM bokashi buckets; visit www.zingbokashi.co.nz for further information. Food scraps can also be accepted in larger council or commercial hot-composting schemes
- Many charities collect redundant coins and used stamps for fundraising.
- Recycle old cell phones through Spark, Vodafone and 2Degrees stores.
- Some electronics and stationery stores accept unwanted toners or ink cartridges for recycling: ask at your retailer.
- Recycle redundant and unwanted electronic waste (phones, calculators, printers, LED screens, keyboards) via the Council transfer stations. Fees may be charged.
- Recycle clean clothes and shoes, which are still in a good condition via clothing bins or a charity shop, or sell them. School offices may help with uniform re-use.
- Unwanted scrap metal, whiteware, engine oil, gas bottles, waster-based paint in cans and certain types of green waste are recyclable via Council transfer stations.

Disposal – placing of waste into land intended for that purpose.

Being a modern landfill, it is lined with clay and heavy sheets of plastic, which are initially covered with sand and gravel, so that the waste which is compacted down by large vehicles, does not puncture the liner. A landfill needs to be lined because, as rainwater seeps through the rubbish, it picks up substances some of which could harm the environment. This leachate is collected and removed to prevent it leaking into soil or water and is pumped to a holding tank in preparation for safe disposal.

A modern landfill is constructed in sections called cells, and each time a cell fills up it is topped off and capped with clay, soil and grass. Trucks and trailers of waste arrive on a daily basis; the waste is deposited into the 'active cell'. Once tipped, it is compacted by a toothed-wheel compactor.



Photo: A compactor bin of waste being tipped into a cell at Kate Valley, North Canterbury.

The blue bin here holds approximately 10 tonnes of waste.

Some forms of waste take longer to break down, as suggested in the following table:

Relative Time for Materials to Break Down in a Landfill.	
Paper and card	Between four months and a year
Fruit Peelings	Approximately six months
Milk Cartons	Six years
Plastic Carrier Bags	Twenty years, and then only into smaller fragments
Leather Shoes	Between twenty five and forty years
Wool/Cotton Cloth	Between thirty and forty years
Plastic Containers	Between fifty and sixty years (and then into small fragments, but it's not fully broken down)
Polystyrene	Never
Glass	Never
Disposable nappy	Hundreds of years for plastics, decades for contents

Illegal Dumping

Sadly, some people are reluctant to pay for the disposal of their waste. So rather than use the Council's collection service or transfer stations, they opt to dump waste around the countryside on road verges or river beds.

Leaving waste in this manner is illegal and an offence under the Litter Act (1979). If caught, Council can issue an infringement notice, require the offender to remove the litter (and then to dispose of it correctly) or repay the full cost of its removal and disposal.



Photo: Illegally dumped waste on a Hurunui roadside.

Such waste costs ratepayers in that District up to \$30,000/year to clean up.

It should be remembered that illegally dumped waste, which the Council has to clean up and dispose of, is a cost to every ratepayer. Should you see illegally dumped waste,

do not touch it, but contact the District/Unitary Council with location details and waste type. Photos are useful. Prosecution might result.

Class Challenge Projects

Make a 'mini-landfill': see how long waste takes to break down

To see how long it takes waste to break down over a school term, collect some clear containers with lids (e.g. from takeaways) and half fill them with soil. Also gather some unwanted materials, such as food, paper, cotton and synthetic fabric, plastics, etc.

In each container bury only one type of material. Place the waste towards the edge of the container where it is easily seen and found and label each container with a waterproof note of the type of material it contains.

Add further soil on top and dampen it, ensuring a depth of at least one cm is left unfilled at the top. Monitor each container after three and six (or more) weeks and from this, try to predict what will and will not eventually decompose.

Remember to record how materials change over the time. You could discuss as a class what may happen to the waste at the sealed landfill, where much less oxygen is available and the chemistry of decay is different.

Litter Campaign

Is litter a problem in the school grounds? If yes, run a campaign to encourage everyone to dispose of litter correctly. Possible ideas include:

1. Undertaking a poster campaign, encouraging everyone to use both the litter and recycling bins. Colour-code the bins to distinguish them clearly.
2. Produce and perform a class play to a school assembly on the importance of not dropping litter, perhaps include something to emphasise the dangers and problems litter can cause: such as slip or cut accidents, encourage rats, hazard if blown away and eaten by farm livestock or wildlife, can pollute water, looks ugly, smells.
3. Participate in the annual Keep New Zealand Beautiful campaign.
Further information on this is available on the web at <http://www.knzb.org.nz/>



4. Eat your lunch and morning tea snack in one place, as eating from packaged items on the move can spread waste along the paths.

5. Undertake a litter pick around the school grounds, then audit the waste collected to determine how much could be recycled, but remember gloves should always be worn when picking up litter and hands be washed well afterwards.

Role-Play Class Debate

Although there will always be waste, some may ask, what will happen when the landfill site is full?

Imagine this is a real life situation and organise a class 'role play' debate in which there is to be a District or City Council meeting to discuss how to manage waste disposal once the landfill is almost full and a new site is needed.

People need to each represent different view-points, so suggestions include the following:

- Local residents, farmers and ratepayers, perhaps downwind of a potential site or affected by truck traffic.
- Local schools and preschools.
- District/City/Regional or Community Board Councillors.
- Environmentalists, protecting groundwater, rivers and wildlife.
- Local businesses producing waste, paying Rates for services.
- Tourism representatives.
- Owner of land proposed as site of a new landfill (they may be for or against?).

Those representing each role could prepare a couple of sentences describing why they are interested in the issue and present to the class how it may affect them in the role they play, in preparation for the debate.

Perhaps a teacher could be the Chair and facilitate the discussion?

(End of Part Two – Part Three is a set of new files, named W&R-Part3 a *through to j*)