



Ministry for the
Environment
Manatū Mō Te Taiao

Sustainable Management Fund

Greenwaste and Organic Disposal Options For the West Coast

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West Coast Waste Management Group

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MFE Funding and Expected Outcomes

The West Coast Regional Council over the last two years has developed a good working relationship with MFE in relation to waste issues in the region. Approximately two years ago, MFE representatives attended a WCWMWG meeting, which led to the development of the Regional Waste Strategy document for the West Coast. MFE also assisted in the implementation of the Hazardous Waste collection and have recently contributed to the current Waste Minimisation objectives for the Region.

The proposed MFE funding outcomes for the Waste Minimisation Project are:

- Report on the current situation of waste minimisation on the West Coast.
- Financial and economic report on waste for the region.
- SWAP analysis to be completed at Westport and Greymouth landfills.
- Waste exchange and waste directory implemented.
- Farm plastic and Agricultural chemical waste investigated.
- Regional education programme implemented.
- Report on organic and greenwaste disposal options on the West Coast.

1.0 Executive Summary

The report considers various options for organic waste disposal that might be applicable to local government on the West Coast, with a view to facilitating the development of a regional approach. The report explores two main themes.

- To outline regional organic waste management options and the principles of economically sustainable development. Conclusions are summarised and suggestions are made for further action.
- Four possible alternatives for the disposal of green waste: landfilling, composting, chipping/mulching and pyrolysis for the purposes of energy renewal.

The report focuses primarily on options for managing greenwaste. Two options for composting putrescible (food waste) are also briefly discussed. The findings of the report are not intended to be definitive or complete but present issues and actions that may be relevant to the West Coast. Composting systems are discussed but not operational procedures for managing a composting facility, which fall outside the scope of this report.

1.1 National Waste Policy

In March 2002 the Ministry of the Environment launched the New Zealand Waste Strategy document. The strategy set challenging but achievable national targets.

The Waste Strategy set the following targets for organic wastes:

- By 2005 a 60% reduction of green waste diverted from landfill.
- By 2010 a 95% reduction of green waste and commercial organic wastes going to landfill.

Strategy targets are currently goal statements and not mandatory requirements. Local government is encouraged to set targets in line with national targets.

1.2 Organic Waste Issues

The current practice of organic waste disposal to landfill has problems such as

- increasing costs of landfilling,
- increasing waste volumes
- depletion of available landfill space,
- the need to meet higher standards to avoid environmental contamination.

It is noted that the development of a viable organics industry on the West Coast, is severely hampered, by its relatively low population and small quantities of total organic

waste, therefore there is no advantage for economies of scale. This is a critical point in relation to the national waste strategy.

There is general community concern that the current situation is not sustainable without the efficient use of resources, and effective waste strategies. However, while many people are concerned about the environmental impacts of waste disposal, only the most committed take an active role in waste management.

1.3 The Four Options

1.3.1 Landfilling

Given the diminishing scope for expanding landfill capacity in Buller and Westland districts and the environmental problems surrounding sites, landfilling does not present a viable long-term option for the disposal of green waste. Key national policies clearly recommend that greenwaste should be diverted from landfill.

1.3.2 Composting

Composting presents a viable long-term option for the management of green waste. There are clear environmental benefits from composting, including the reduction of waste to landfill and potential economic benefits. Critical to the success of any composting operation, however, is the quality of the organic material produced.

Significant financial outlay is required to establish the composting infrastructure with the capacity to deliver a high-grade product.

Indications are that for the economic and environmental benefits to be fully realised composting needs to be a manufacturing process capable of producing a high quality, commercially viable product.

While composting presents a sustainable, long-term alternative to the current methods of green waste disposal it cannot be a complete organic waste disposal solution.

The considerable resources needed to develop the necessary infrastructure, are likely to be prohibitive particularly given the absence of economies of scale on the West Coast. Nevertheless, it is an option that should be given further consideration, in conjunction with chipping/mulching, as part of an integrated approach to green waste management.

1.3.3 Chipping/Mulching

Chipping/mulching, sometimes referred to as shredding, is an effective and reasonably cost effective method of dealing with green waste. Not only does it reduce the mass and volume of waste going to landfill, it also constitutes the first step in any larger-scale composting operation. The quality and purity of the material dictates the usability and consequently the marketability of the end product.

To be more than a simple waste disposal method and to realise the potential for waste diversion, chipping/shredding and composting should be considered as an integrated manufacturing process capable of producing a high quality recycled organic product.

The financial outlays for mulching are less than those required to establish an effective composting infrastructure and there is a limited range of technology that may be appropriate for the level of mulching required on the West Coast.

An option would be to adopt a regional approach – either purchasing equipment for use by a group of councils within a region or by contracting to a private contractor.

1.3.4 Fast Pyrolysis for Energy Recovery

The West Coast is exploring the feasibility of energy to waste technology {fast pyrolysis] to recover energy from green waste, plus other wastes, with the possibility of developing a renewable energy generating plant.

For community smaller scale composting options - Vermiculture and Fermentation methods are outlined.

1.4 Conclusion

The management of greenwaste on the West Coast is an issue and as such demands responsibility from Local Government. Removing traditional modes of greenwaste disposal (burning) needs to be matched by a commitment on the part of the Local Government to explore viable alternative disposal options other than landfilling.

None of the options outlined, presents a satisfactory short-term solution to the current problems experienced by rural West Coast Councils in disposing of green waste.

A number of actions are suggested to progress organic waste disposal on the West Coast which include

- Buying a second hand mobile shredder for the region to produce good quality mulch for resale. Shredding gives volume reduction of material and is the start if a composting process which could be pursued at a later date.
- Exploring innovative methods of composting small quantities of putrescible at sites generating larger volumes of food waste.
- Investigate new small-scale cost effective composting systems suitable for hospitals and hotels etc. as they become available.
- Provide ongoing education and explore new home composting systems as they become available.

2.0 Introduction

2.1 Purpose

The purpose of this report is to conduct an assessment of various options for green waste disposal that might be applicable to Local Government on the West Coast with a view to facilitating the development of a comprehensive regional approach.

The findings of the report are not intended to be definitive or complete, but rather present a 'snapshot' of green waste management concerns, issues and actions that may be relevant to the West Coast. They are presented in good faith to facilitate a better understanding of the issues and a more co-ordinated regional response to green/organic waste disposal practices.

2.2 Background

Organic wastes form a large proportion of the waste stream. Landfilled organic wastes produce leachate and generate methane, a greenhouse gas. A 60% reduction nationally in landfilled gardenwaste would bring total landfill volumes down by as much as 800,000 tonnes and save approximately \$40 million in disposal costs (based on a national average price \$50/tonne disposal costs).

2.3 Aims and Objectives

This report aims to investigate alternative methods of green waste disposal for possible application by West Coast Council's.

The report principle objectives are:

- To define the term 'greenwaste';
- To outline green/organic waste issues on the West Coast
- To present various options for the disposal of, organic /green waste issues.
- To summarise conclusions and make suggestions for future action.

3.0 Green Waste Definition

For clarity and consistency a definition of greenwaste is given and used throughout.

The terms 'greenwaste' and 'organic waste,' are often used interchangeably. Green waste has been classified as part of the 'organic waste stream' and as part of the 'compostable waste stream', which also includes food wastes.

The definition used for this report defines green waste to include: garden clippings, leaves, grass clippings, plants, bulbs, root balls, tree/shrub prunings, tree loppings, branches, large trees and stumps arising from domestic and Council activities.

Note that the definition does not include other materials that are often placed in the organic, waste stream such as:

- Already composted or mulched greenwaste
- Putrescibles
- Bio solids and sludges
- Animal manure.
- Flax, Cabbage Tree leaves and Toi Toi

This report focuses primarily on options for managing greenwaste, however two community options for dealing with putrescible wastes are also discussed.

4.0 Policy

4.1 General

The waste management industry faces problems such as increased disposal costs, contamination of the environment as well as a continual depletion of available landfill space. There is general community concern that the current situation is not ecologically sustainable without efficient use of resources, and effective waste minimisation strategies. As a result there is increasing pressure, driven largely by community expectation and government policy, to better manage and reduce waste.

4.2 New Zealand Waste Strategy

In March 2002 the Ministry of the Environment launched the New Zealand Waste Strategy. This strategy covers solid, liquid and gaseous waste, and recognises that moving towards zero waste and a sustainable New Zealand is a long-term challenge. It has five core policies that are the basis for action:

- A sound legislative basis for waste minimisation and management.
- Efficient pricing – pricing policies as far as practicable possible, reflect the full cost of waste disposal.
- High environmental standards.
- Adequate and accessible information.
- Efficient use of materials to offer more reuse or recycling options.

The Waste Strategy, emphasis a shift from the reduction of waste to landfill, to the sustainable recovery of resources. That is to say, the value of resources that are recovered is significant, rather than the quantity of waste, being diverted from landfill.

Organic waste forms a large proportion of the waste stream. They include garden and kitchen waste, food processing wastes and sludge. Landfilled organic wastes produce leachate and generate methane, a green house gas.

Targets for organic wastes are:

- By December 2005, 60% of garden wastes will be diverted from landfill and beneficially used and by December 2010 the diversion of green wastes from landfill to beneficial use will have exceeded 95%.

- By December 2007 a clear quantitative understanding of organic waste streams such as kitchen waste will have been achieved.
- By December 2010, the diversion of commercial organic wastes from landfill to beneficial use will have exceeded 95%.

Strategy targets are currently goal statements and not mandatory requirements, however local government is encouraged to set targets in line with national targets.

The West Coasts relatively low population and small quantities of organic waste produced have inhibited the development of the recycled organics industry in the region. Advantages of economies of scale do not exist, contributing to unviable costs for collection and processing of recycled organics.

5.0 Green and Putrescible Waste Management Issues on the West Coast

The current practice of green/organic waste disposal to landfill has problems such as:

- a trend toward increasing volumes,
- meeting higher standards to avoid significant contamination of the environment,
- continual depletion of available landfill space.

The West Coast region currently sends over 24,000 tonnes of waste to landfill each year at the three main landfills at Westport, Greymouth and Hokitika. Although there is limited information available on waste volumes and composition, it is estimated that putrescible and greenwaste volumes are increasing, due to tourist industry growth, and increased land clearance i.e. subdivision development.

5.1 S.W.A.P. Analysis Results

Currently at the three main West Coast landfills, greenwaste is collected separately and stockpiled.

- Hokitika landfill, volume reduction is achieved by crushing with running heavy machinery.
- McLeans site, greenwaste is showing an observed apparent increase in volume due to sub division development in the district. Greenwaste is stockpiled and used as landfill cover.
- Westport greenwaste is stockpiled and then used to create bunds around the landfill
- Putrescibles are mixed in with other general waste and landfilled.

Information on greenwaste and putrescibles volumes from SWAP analysis for Hokitika and Westport landfill sites are:

Westport Survey July 2005

Organic material accounted for 26% of the total waste stream of 7,050 tonne for the survey. On the week of the survey of the 12,000 tonnes of greenwaste was disposed off

- approximately 11,500 tonnes of materials was available for composting. Greenwaste is received separately at the site.

The table below shows the breakdown of organic waste volumes

	Kitchen		Garden		Totals	
	kg	%	kg	%	kg	%
Commercial	3,630	16.48	2,021	9.18	5,651	25.66
Kerb	2,467	11.20	156	0.71	2,623	11.91
Residential	3,719	16.89	10,030	45.54	13,749	62.43
Totals	9,816	44.5%	12,207	55.43	22,023	100

Hokitika Survey Feb 2004

Organic waste accounted for 25% of the total waste stream of 6,040 tonne during the February 2004 survey. Greenwaste accounted for 20.44%, by weight, of the total waste stream.

Classification	Commercial	Residential	Kerb Collection	Total	% Total
Putrescible	9,362.40	20,996.90	1,164	31,523.30	25.48

Greymouth

No information was available at the time of writing the report although a S.W.A.P. Analysis has been recently completed at the McLeans landfill.

Base line Data with Other Regions

The Ministry of the Environment maintains a database on results for S.W.A.P. studies. The data below is available on their website along with results from other regions

	NZ Mean	Hutt	Kaikoura	Marlborough	Hokitika	Westport
	2004	Dec 2004	Sept 2004	Jan 2005	Feb 2004	July 2005
Putrescibles %	22	21.2	24.9	26.0	25.5	16.2

The WWG has prepared a Regional Waste Strategy with the following relevant targets and actions:

- Investigate opportunities for implementing waste minimisation programmes for the facilities and assets managed by the four Council.
- District Councils to set targets for the diversion of organic waste from disposal.
- Investigate options for the beneficial use of garden waste on the West Coast.

The West Coasts' low population of 33,000 and relatively small quantities of organic waste produced have inhibited the development of the recycled organic waste industry in the region to date. Advantages of economies of scale do not exist, and this has

contributed to unviable costs for collection and processing of the organic waste stream within the region.

There is general community concern that the current situation is not sustainable without efficient use of resources, and effective waste minimisation strategies. As a result there is increasing pressure, driven largely by community expectation and government policy, to better manage and reduce waste. However, while many people are concerned about the environmental impacts of waste disposal, only the most committed take action to reduce their individual impact or take an active role in waste management.

6.0 Options

6.1 Landfilling

This is not the preferred option and does not meet national Waste Strategy targets,.

At current rates of disposal West Coast landfills will have reached capacity by:

- Grey District approximately 40 years.
- Buller District currently commencing a 3 year extension to the Westport landfill.
- Westland District approximately 2 years.

There are well-documented environmental problems surrounding landfills. These problems are not restricted to poorly managed landfill sites and can persist after a site has been closed and rehabilitated. They include:

- Groundwater and surface water pollution through contaminated liquid seeping from lower levels of the landfill site (leachate) which contains nutrients, heavy metals such as lead and residual chemicals such as pesticides.
- Release of green house gasses (methane and carbon dioxide) through decomposition of materials in the landfill.
- Odours and litter while the site is in operation.
- Potential noise from traffic related to public use of the site and its operation.
- Disease transmission by pests such as rodents, birds, flies and cockroaches.
- Loss of resources when materials, which may be reusable or recyclable, are buried.

Despite the problems surrounding landfills, it is likely that it will remain the most appropriate method of waste disposal. Well managed and approved landfill sites, should accurately reflect the actual cost associated with dumping waste at a landfill, to include triple bottom line considerations (environmental, economic and social) on society.

The increasing community resistance to the establishment of new landfills adjacent to residential areas and the rising costs of sourcing new facilities means the scope of expanding landfill capacity to meet expected demand is restricted.

If waste management practises are going to change then the community, local government and industry require a behavioural and attitude shift.

Such a shift demands an acceptance by individuals, of the cost of environmental impacts they cause, and this is the basis of the User Pays Principle.

Increasing prices for disposal at landfill creates extra revenue that can be returned to waste management, plus works as an incentive to find alternative methods of waste disposal for recyclables within the waste stream.

On the West Coast it may initial cause an increase in orphan waste dumped in the bush but with increasing peer pressure and a sound education programme the problem should be minimised after a period of time.

In Christchurch a landfill levy has been introduced. An individual who disposes of waste is charged an additional fee (\$6/tonne for waste to landfill). Half of the money received from the levy is returned to Local Government to be utilised for further waste management activities.

There is the potential to impose bans on the dumping of green waste at landfill sites as have has been done in Australia.

Key national policy clearly state that waste in general, and green waste specifically, should be diverted from landfill.

6.2 Composting

Composting is the oldest and the most natural form of recycling organic material. It can be defined as the aerobic (oxygen requiring) biological decomposition of organic waste to yield a stable, hygienic material that is beneficial to soil and plant growth.

Composting can be undertaken on a range of levels: from home composting units (not discussed) through to community schemes up to large centralised sites that can handle thousands of tonnes of material each year.

Important factors to consider when planning any composting operation are:

- Location
- Composting system
- Space requirement
- Hard surfaces
- Buildings
- Machinery
- Personnel

Model Compost Facility Design Quantities Example only

Assumption on Quantities

- | | |
|----------------------------------|--------------|
| • Incoming waste | 16,000tonnes |
| • Compost yield factor by weight | 64% |
| • Shredded density | 0.33t/ cu.m |
| • Compost density | 0.59 t/cu.m |
| • Reject density | 0.50 t/cu.m |

- Summer/ winter ratio 1.20
- % of rows turned daily 20%
- % of reject material 10%

Mass Balance Calculations for a model Composting facility (Example only)

Assumption

Total incoming waste of 46,000 tonnes/yr

Waste type	% by weight	Moisture content %	Dry Solids tonnes/yr	Water content tonnes yr	Biological Degradation %	Processing losses tonnes	Remaining solids tonnes
Grass clippings	50.0%	52.5%	10,923	12,075	40.0%	4,370	6,555
Leaves	25.0%	35.0%	7,475	4,025	40.0%	2,990	4,485
Brush	25.0%	45.0%	6,325	5,175	20.0%	1,265	5,060
TOTALS	100%		24,725	21,275		8,625	16,100

Summary

Remaining solids	16,100 tonnes/yr
Moisture content	45.0%
Gross tonnage	29,273 tonnes/yr
Assumed density	0.59 tonnes/cu.m
Gross volume	49,364 cu.m/yr
Production ratio by weight	63.6%

It is important to note that personnel employed for composting operations will need a basic understanding of the science of composting and have the ability to fully diagnosis composting problems and issues to prevent Resource Consent violations, odour and dust issues.

A composting site can be divided into two areas

- The composting pad area occupied by active piles /windrows, the size of which is affected by the composting method.
- Supporting operations such as reception area, shredding, storage, leachate pond, and buffer zone between land, water or housing.

The composting method effects the composting time (length of time the material remains on the pad) and machinery/plant requirements.

Promoting elevated temperatures and maintaining moist and aerobic conditions within the composting mass accelerates the process.

By stabilizing the organic material, pathogens and weed seeds are reduced.

A note of caution: due to chemical contamination of chlopyralid a weed killer used extensively in the South Island on lawns and in the Agriculture industry it is advisable to consider excluding lawn clippings from any potential composting operations.

The composting process can take a number of different forms. Traditional open systems, such as windrow composting, simply require windrows of the compostable material to be subjected to aerobic decomposition. The piles can be aerated, either manually (loader) by mechanical methods (Windrow Turner) or by static aerated piles (forced air by fans). Outdoor Windrow systems have a high space requirement and increase the chance of nuisance factors such as odour and dust, due the relatively uncontrolled nature of the process. In high rainfall areas windrow covers can be used particularly towards the end of the process. Greenwaste is particularly suited to such simple comparatively low cost methods of composting.

More sophisticated and expensive composting units enable a more controlled compost process to be undertaken on a wider range of organic materials. Aerobic composting plants, such as vertical composting units,(V.C.U) tunnel composting (CTI Bag System) and drum [Hot Rot, Rotocom] composters, allow the biological processing of a wider range of organic materials to occur in an the enclosed environment. (See Appendix A for information on composting operations in N.Z.)

Aerobic decomposition plants, as above, are also well suited to composting well shredded green waste, but can only be justified if mixed with other organic waste such as food or grease trap waste.

Anaerobic decomposition plants also use enclosed systems. The process relies on a naturally occurring biological process that modifies the chemical and physical structure of organic materials, in the absence of oxygen.

This type of composting is usually employed for organic waste such as sewage or sludge. (See appendix A for composting systems currently in use in N.Z.)

Stable or mature compost has a variety of uses depending on the quality of the product. Low quality compost can be used primarily at landfill for site restoration and regeneration or as a form of landfill cover. Poor quality compost cannot be used in public spaces or sold as a garden product.

In contrast, high quality compost, which has little or no contamination from plastics or chemicals, has a much wider potential use, such as a soil conditioner, or a base for potting mix or other products. Uncontaminated green waste provides an excellent source of high-quality compost.

There are also numerous benefits that arise from the composting process:

Social benefits

- Composting helps to achieve waste disposal strategies.
- Composting provides an opportunity to reduce the volume and mass of waste going to landfill.

Economic benefits

- Reduced levels of waste going to landfill means a reduction in landfill management costs and related environmental costs.
- Composting (on larger scales) provides significant employment opportunities.

- Compost as a product has the potential to reduce reliance on imported fertilizers. Trials have shown with annual applications of some composts, fertiliser requirements can be reduced by as much as 20%.

Environmental benefits

The largest benefits that arise from the composting process, however, are environmental. When compost is added to soil:

- It improves its structure.
- It increases its biological activity.
- Returns organic material and increases soil fertility and productivity.
- Improves soil moisture retention.
- Can be used for soil remedial work.

Composting wastes helps to minimize and reduce leachate problems that arise at landfills and the life of landfill sites can be significantly increased.

The disadvantages associated with the composting process, include odour, dust, and noise, plus some health and safety risks on poorly managed sites.

However the main disadvantage is, the significant financial outlay required to establish an effective, high-quality composting plant. Establishing the required infrastructure can amount to an investment of millions of dollars. The viability of composting as a process in financial terms is less easily determined than its undoubted environmental benefits.

Given the significant financial implications of establishing a composting facility, considerable research and planning would be required before any decision is made on whether to pursue this option. The aim of any well-managed composting facility is to cover the operational cost of handling, shredding and composting the material, by gate fees with profits made from the sale of compost products. This takes the waste disposal contractor out of the service sector and into the manufacturing and marketing sector, where he will face all the constraints of market forces, consumer demand and product quality.

The question is then no longer how to dispose of the organic waste, or acquire the technology, as this can be relatively easily purchased depending on funds. Instead it is how to run a business that manufactures a very high-volume, low-value product that must seek penetration into a highly competitive, discerning market that is subject to wide seasonal fluctuations.

6.2.1 Innovative Waste

Kaikoura Model

Kaikoura issues of tourism, funding and low population are similar to those facing the West Coast, therefore they have been used as a model for the possible way forward for an individual council approach.

The operation to manage the Kaikoura transfer station and landfill is a partnership between the council and a private contractor. Current charges for disposal are

- Refuse Domestic \$90
- Refuse Commercial \$100
- Green waste \$30
- Business Pick up of recyclables \$11.25 weekly

Currently exploring kerbside collection of recyclables including putrescibles using a two green wheelie bin system.

They compost green waste and putrescibles using the following low cost system equipment.

- Vermeer BC 625a chipper now 5 yrs old, manual feed
- Mower r/Mulcher (100hp) with 2 sets of blades that can be reground
- Three ton Hitachi digger with small bucket
- John Deere front end loader with attachments
- Self engineered Trommel screen

They are looking to purchase a new shredder or tub grinder to reduce handling costs and increase efficiency. Approx. 1,200/1,600 tonnes of materials are processed annually.

Putrescibles and small green waste material are chopped and mixed using the mower mulcher. Larger branches/pruning are chipped. Mixed materials are then placed in a horizontal concrete composting unit 2m high by 2.5metres wide, and 30 metres long. The roof is made from sloping galvanised sheet and rests on 40mm angle iron; the ends are sealed by box section. The compost is moved approx. one metre daily through the unit by loader, over a 30 day period to produce a coarse product that needs further stabilisation. Coarse material is screened out and reused. No resource consent was required for this composting unit as it complied with the current landfill resource consent.

Costs

Moulds for the compost unit \$8K

Hitachi digger \$20K

Trommel Screen \$5k

Vermeer chipper \$24k

Composting unit \$15k

Compositing operation costs

Revenue \$15K
Operational \$20,600
Annual Loss \$5,600

In summary, composting presents a sustainable, long-term alternative to the more traditional forms of green waste disposal, such as burning, using as bunds and landfill. It is important to note, however, composting can never be a complete waste disposal solution on its own, and the considerable resources required for its implementation and development may be prohibitive.

6.2.1 Composting systems suitable for Communities

Vermiculture

Vermiculture or the worm industry is an intensive industry, which does not require large areas to operate on. It can be a very successful home industry and is suitable for schools and community groups. Big is not necessarily better, particularly in an intensive livestock system, farming *Eisenia foetida* or tiger worms. When worm farming on a commercial basis the following need to be given serious consideration:

Stocking density

Surface area for feeding

Temperature - worms are dormant under 10C and die above 30C

Working layer – Area in system were worms currently feeding

Husbandry management

Management systems

Worm Castings - end product for sale

Vermiculture is more suited for the disposal of some kitchen food waste materials but the material before it can be feed to the worms requires grinding/mixing and pre composting for sterilisation purposes.

Effective Microorganisms

Effective Microorganisms or E.M. is a combined culture of living entities containing active microbes. It is non-toxic and Bio-Gro certified. It can be made into E.M. Bokashi which is a fermented compost starter made from sawdust. When the correct conditions are provided E.M. bokashi begins a fermentation process to transform food waste and other organic materials into compost. This system can be easily implemented in an indoor environment and is suitable for schools, households, restaurants and businesses to compost their food waste. This system is available throughout N.Z. and has been part of a food waste collection and composting trial in Christchurch and is popular with home composters.

6.3 Chipping/Shredding/Mulching

Chipping is a relatively common process relying on specialised equipment to reduce greenwaste to woodchip particles of varying sizes. Also referred to as shredding, grinding or mulching, there is a limited range of equipment in NZ that exists with the capacity to treat green waste from small bushes to large trees, stumps and power poles.

Given the bulky nature of green waste, chipping/shredding provides an efficient and effective method of reducing both the mass and volume of waste going to landfill and can be used to rehabilitate old landfill sites and as a mulch.

Chipping/shredding green waste is the first step in any larger-scale composting operation.

6.3.1 Shredding options on the West Coast

Regional Approach - Mobile Contractor

While there are some problems associated with the chipping process, such as noise, dust and health and safety issues, these are less than those associated with composting. There is the need for strict adherence to occupational health and safety requirements, as well as the need for appropriate training.

Perhaps the biggest challenge for chipping/shredding is the quality of the end product. Again, the quality of the incoming material dictates the marketability and extent to which chipped/shredded greenwaste can be sold to, and used by, the general public. Low quality chipped greenwaste has relatively little scope for reuse, and in some instances will end up being a waste product because it has no economic value. Accordingly, if chipping/shredding is to be more than just a waste disposal method and achieve its potential for waste diversion, it must be seen as a manufacturing process, producing a high quality recycled organic product.

The financial outlays for the specialised equipment required to chip/mulch greenwaste can be considerable although less than that needed to establish an effective composting infrastructure.

Three types of chipping/mulching equipment are outlined below; they differ in price and have varying advantages and disadvantages.

Brush Chipper: Suited to high volumes of woody material particularly land clearing; can process material up to 100 centimetres in diameter, depending on model/type; high-level productivity; usually manually feed highly portable.

Cost: \$150,K upward

Is able to process a broad range of green waste material at a moderate cost, this machine mostly used by Councils and tree felling operations.

Tub Grinder (Ripper): Large, powerful and efficient. Suited to large land clearing operations and organic/wood processing facilities, able to process material up to 3.4

meters in diameter; portable Have high health and safety risks and not to be used with public present Cost: \$600K upwards

Horizontal Shredder (Willibald, Seiko): Latest technology, suitable for large-scale reduction and recycling of green waste and storm debris. Able to process the broadest range of greenwaste material including hardwood, and pallets. Can have high maintenance and running costs. Slow speed shredder options available (Brentwood) but product quality can be poor and not suitable if considering putrescibles or other organics. Maintenance and running costs are lower. Available diesel or electric Cost: from \$300K upward.

A second hand Hussmann has become available in the South Island at a reasonable price, and warrants further investigations. (See Appendix B)

Some examples of cost, to hire a shredder for use in the West Coast are:

- \$250 hr plus loader hire and transport for a tub grinder type called a Ripper from Delta at Dunedin Landfill
- \$210 hr plus loader for a small tub grinder from Bond Contracting, Invercargill.

Currently, all shredders that maybe for hire in the South Island are fully utilised and not available for additional work.

The basic chipper still represents a large financial outlay, and is probably beyond the means of most small rural Councils on the West Coast for whom greenwaste disposal is a significant issue. One option is to adopt a regional approach, managed by community organisations such as B.C.D.C. Or alternatively the chipping/shredding equipment could be purchased through a cooperative arrangement between Councils, contractors and or community.

Depending on the type of equipment purchased, the chipper/shredder could be moved around on a demand basis (for instance on a fortnightly basis) including seeking work outside the region.

It is acknowledged that a regional approach may present some management difficulties due to other/existing local contractual agreements i.e. landfill contracts.

Model Scenario

The shredding is subcontracted out to a regional contractor, who treats the waste at a cost of approximately \$ x per cubic meter of green/mulch produced.

The Council has indicated that shredding is conducted up to twelve times per year (or more if there is a seasonal demand) Any material/mulch produced would be the property of the council.

The contractor may provide this chipping/shredding service for a number of other Councils/business, around the West Coast/ South Island.

Central Otago District Council Experiences:

An example of a small council that has tried different disposal options:

To feed a horizontal type shredder with greenwaste, machinery with a long reach and a grapple/grab type bucket was required. It was considered an expensive way of making a small quantity of low value organic matter.

A digger-mounted shredder was trialled. It was considered not too successful as it tossed material everywhere and created health and safety issues in site.

Currently green waste at transfer stations is being pushed into windrows using a D6 or D7 size bulldozer with near new tracks, which then rolls over the material. This method requires plenty of space, is quick and economic and costs approximately 15% the cost of shredding. The end product is used to cover the surrounding mined land that has no topsoil.

At smaller sites old gravel pits are being filled with green waste and the material is pushed up with a hired loader once or twice a year. The sites are well signed with an "abuse it or lose it" message. Central Otago has found that there is less contamination at these sites than at the managed sites. It is hoped that at a later date these pits may be mined for organic matter.

Chipping/shredding is an integral part of the composting process, and is the first step in the implementation of a composting operation. This approach would provide an effective solution to the green waste issue on the West Coast, both long and short term and in relation to environmental, economic and social considerations.

6.4 Incineration – energy recovery and other systems

Incineration is a form of burning materials, and is a method of disposal widely adopted internationally. This is not considered a viable option for the West Coast

Other systems burn green waste for conversion into energy for power supply. The West Coast is exploring the feasibility of energy to waste technology [fast pyrolysis] to recover energy from green waste plus other wastes with the possibility of developing a renewable energy generating plant. Green waste and putrescibles would be only a small proportion of the total to any such facility, given the low tonnages available, low inherent energy levels and high water content. As greenwaste collection points are distributed all over the region, handling and transport would be an issue.

In the Waikato there is a trial Biomass System that converts on farm wastes into energy by use of a bio-digester. The system converts agricultural pollutants (manure/sludge) and process them into energy and fertiliser thereby offering an environmentally and sustainable solution to an increasing problem. There is the potential to add putrescibles and commercial food wastes to such a system.

9.0 Conclusions

Greenwaste and organic disposal is an issue that is demanding more attention. With increasing environmental pressures, community concerns and improved technology, more attention needs to be focused on this area and the potential benefits that effective and efficient greenwaste management can deliver.

Greenwaste management demands a concerted and coordinated effort from the community, local government and industry to ensure a sustainable and achievable approach is adopted.

Local Government, as a community leader, policy maker and service provider has the ability to be influential in terms of greenwaste management, particularly through incentives to reduce greenwaste and increased public education programs. Importantly, Local Government needs to stay informed about how best to manage and reduce green waste in particular.

In terms of the community, it has been noted that while many people are concerned about the environmental impacts of waste disposal, only the most committed take action to reduce their individual impact or take an active role in waste management. It is important that the West Coast community as a significant contributor of greenwaste realises that individuals have a responsibility for avoiding, reducing and recycling green waste and organic materials. Greenwaste and organics require considerable public education and a focus on 'fostering sustainable behaviour'.

Although landfilling was discussed it is considered not an option to meet the national Waste Strategy targets.

Three main options for green waste and organics have been identified.

The first was composting, which presents a viable long-term option for the management of greenwaste disposal. Critical to the success of any composting operation, however, is the quality (or purity) of organic material to be used as compost as this will affect the end use of the product. There are also significant financial outlays to develop the required infrastructure, and this may well be a prohibitive factor when considering adopting composting as a green/organic waste disposal option.

Options for small scale putrescible composting would have the potential to reduce volumes to landfill particularly in high tourists areas as the Glaciers but cost could be an issue.

Home composting systems suitable for putrescibles would have a limited impact on total volumes to landfill and require promotion and education but are worth considering.

The second alternative is Shredding/Chipping, which also suffers from material contamination issues similar to composting. If chipping and composting are to be more than just a green waste disposal option, there is a need to produce a high quality product that can be sold to the general public. However, this will not occur without

some market research and incentives to develop recycled organic markets on the West Coast i.e. mulch requirements of Solid Energy for site reclamation.

Chipping maybe the most appropriate short-term option, with the potential for it to be part of a long-term integrated composting process. As mentioned above a regional approach to chipping /shredding may be a viable option through the purchase of appropriate chipping/shredding machinery either by councils, community group or contractor.

The final option is the green waste-to-energy operation. A renewable energy plant on the West Coast would possibly need waste resources from outside to ensure financial viability. The financial outlay, for such a facility, would be a limiting factor.

Developing an effective Regional strategy for green/organic waste disposal is contingent upon a number of crucial factors and relies on leadership, cooperation and a concerted effort by the community and local government.

It should be recognised that greenwaste and organic management is an issue of growing importance and increasing significance and as such demands responsibility by Local Governments.

10.0 The Way Forward

Suggestions for green/organic waste disposal on the West Coast:

Chipping/Mulching would be the preferred option for volume reduction of greenwaste initially. As there is no possibility of hiring a mobile shredding contractor on the South Island explore the option of buying a second hand mobile shredder for the region so as to produce a good quality mulch product with a resell value.

Explore the options for innovative methods for composing small quantities of putrescibles at sites where commercial food waste is a large portion of the waste stream i.e. Fox and Franz Glaciers

Investigate the possibility of using the concrete moulds from Kaikoura composting unit to build similar units at each of the three main centres (or landfills) at Westport, Greymouth, and Hokitika. This will then allow composting of all materials.

Encourage source separation of organics at home for home composting and provide an on going education programme. In conjunction with exploring new home composting initiatives including Effective Microorganism. as they become available.

As commercial composting is a relatively new industry and continually evolving - investigate new small-scale cost effective composting systems suitable for hospitals hotels etc as they become available.

Appendix A

Operational Composting Sites in New Zealand

Information from the University of Canterbury

Northland Region:

No full composting activities reported. The Far North District Council has however reported green waste collection and mulching at two sites.

Contact: [Matt Kearney](#)

Auckland Region:

Auckland City: Pikes Point.

Operator: Living Earth Ltd.

Raw materials: Green waste.

Brief description: A mechanically turned windrow operation, with product sales both on site and through outside retail outlets.

Contact: [George Fietje](#); website: www.livingearth.co.nz

Auckland city: Unitec Institute of Technology.

Operator: Unitec Institute of Technology.

Raw materials: Food waste and green waste.

Brief description: A vertical in-reactor composting system, with on site product utilisation.

Contact: [Richard Main](#)



Waitakere City: Waitakere City Council Refuse & Recycling Station, 50 The Concourse, Henderson.

Operator and Owner: Perry Environmental Ltd.

Raw material: Green waste, consented to process food-residuals.

Brief description: A vertical in-vessel composting system with a current capacity of 9,000 tonne/yr, operated on a 7-day cycle. Product harvested everyday and removed to an off-site location for further curing (product storage on-site not allowed by the resource consent). Sales to horticulture, cropping and landscaping.

Contact: [Peter Higgs](#); tel. +64 7 829 9678; Websites: www.perry.co.nz and www.revitalfertilisers.co.nz



Waikato Region:

Hamilton: Hamilton Organic Centre

Operator & Owner: Perry Environmental Ltd

Raw Material: Green waste

Brief description: An outdoor windrow system, with turning by excavator. Processing 20,000 cubic metres per year. Finished compost is "Bio-Gro" certified. Sales to horticulture, agriculture, cropping, landscaping and domestic users.

Contact: [Peter Higgs](#); tel. +64 7 829 9678; Websites: www.perry.co.nz and www.revitalfertilisers.co.nz

Taupo: Taupo Organic Centre

Operator & Owner: Perry Environmental Ltd

Raw Material: Green waste

Brief description: An outdoor windrow system, with turning by excavator. Processing 14,000 cubic metres per year. Sales to horticulture, agriculture, cropping, landscaping and domestic users.

Contact: [Peter Higgs](mailto:Peter.Higgs@perry.co.nz); tel. +64 7 829 9678; Websites: www.perry.co.nz and www.revitalfertilisers.co.nz

Bay of Plenty Region:

Rotorua: Rotorua District Council WWTP.

Operator: Rotorua District Council, Marketing through Gardeners Gold Products.

Raw material: Green waste, sawdust, bark fines, lawn clippings & bio-solids

Brief description: Mechanical mixing, bin aeration then windrowing.

Contact: [Andy Bainbridge](mailto:Andy.Bainbridge@rotorua.govt.nz)

Tauranga: Tauranga Organic Centre, Truman Rd, Te Maunga.

Operator: Perry Environmental Ltd.

Raw material: Green waste.

Brief description: An outdoor windrow system processing 20,000 cubic metres per year, with turning by excavator. Finished compost is "Bio-Gro" certified. Sales to horticulture, agriculture, cropping, landscaping and domestic users.

Contact: [Peter Higgs](mailto:Peter.Higgs@perry.co.nz); tel. +64 7 829 9678; Websites: www.perry.co.nz and www.revitalfertilisers.co.nz



Hawkes Bay Region:

Napier/Hastings: Twin City Compost, Springfield Rd, Taradale, Napier

Operator: Napier City Council, trading as Twin City Compost.

Raw materials: Green waste.

Brief description: Outdoor windrow system with mechanical turning. Screened finished compost is sold in retail and wholesale quantities. Oversize material from the screening operation is used as landfill cover.

Contact: [Dominc Salmon](#)

Awatoto, Napier

Operator: Agrich Organics Ltd.

Raw materials: Fish waste, bark and vegetable waste.

Brief description: Outdoor windrow and aerated static pile systems. Screened finished compost is sold in bags, or in bulk, for domestic and export markets. Finished compost is "Bio-Gro" certified and Agrich Organics Ltd is IFOAM accredited.

Contact: [Michael Forde](#) Phone: (06) 834 4292

Taranaki Region:

Inglewood: Green waste is separated, mulched and sold by the landfill contractor.

New Plymouth: Colson Road Transfer Station.

Operator: Manawatu Waste Ltd.

Raw materials: Green waste.

Brief description: Outdoor windrow system with mechanical agitation. Retail and wholesale product sales are made from the site.

Contact: [Bret Coleman](#)

Okato: Green waste is separated, mulched and sold by the landfill contractor.

New Plymouth: Brixton Organic Centre

Operator & Owner: Perry Environmental Ltd

Raw Material: Green waste / paunch grass

Brief description: An outdoor windrow vermiculture system. Processing 8,000 tonnes per year. Sales to horticulture, agriculture, cropping, landscaping and domestic users.

Contact: [Peter Higgs](#); tel. +64 7 829 9678; Websites: www.perry.co.nz and www.revitalfertilisers.co.nz

New Plymouth: Bell Block Organic Centre

Operator & Owner: Perry Environmental Ltd

Raw Material: Green waste / paunch grass

Brief description: An outdoor windrow vermiculture system. Processing 4,000 tonnes per year. Sales to horticulture, agriculture, cropping, landscaping and domestic users.

Contact: [Peter Higgs](#); tel. +64 7 829 9678; Websites: www.perry.co.nz and www.revitalfertilisers.co.nz

New Plymouth: Uruti Organic Centre

Operator & Owner: Perry Environmental Ltd

Raw Material: Green waste & odorous organic wastes

Brief description: An outdoor windrow vermiculture system. Processing 56,000 tonnes per year. Consented to take and process all organic materials including "odorous" wastes. Sales to horticulture, agriculture, cropping, landscaping and domestic users.

Contact: [Peter Higgs](mailto:Peter.Higgs@perry.co.nz); tel. +64 7 829 9678; Websites: www.perry.co.nz and www.revitalfertilisers.co.nz

Manawatu-Wanganui Region:

Wanganui: Budget Waste Transfer station, 27 Gilberd Street, Castlecliff.

Operator: Manawatu Waste Ltd.

Raw materials: Green waste.

Brief description: Outdoor windrow system with mechanical agitation. Retail and wholesale product sales are made from the site.

Contact: [Bret Coleman](mailto:Bret.Coleman@manawatuwaste.co.nz)

Wellington Region:

Masterton: Nursery Rd Complex, Masterton.

Operator: Tararua Resource Recovery.

Raw materials: Green waste.

Brief description: Outdoor windrow system with mechanical agitation. Compost, soil mix and mulch products are marketed wholesale and through an on-site retail outlet.

Contact: [Philip Hancock](mailto:Philip.Hancock@tararuarerecovery.co.nz)

Wellington City: Owhiro Bay, Wellington.

Operator: Living Earth Ltd.

Raw materials: Biosolids, abattoir waste, greenwaste and woodwastes.

Brief description: Fully enclosed indoor facility using a 10 bay International Processing System (IPS). This system uses temperature controlled and forced aeration combined with daily agitation. Screened compost and compost products are distributed to urban and agricultural markets.

Contact: [George Fietje](mailto:George.Fietje@livingearth.co.nz); website: www.livingearth.co.nz

Johnsonville: Ohariu Valley Road.

Operator: Ohariu Valley Indoor Riding School

Raw materials: Mixed horse manure and sawdust.

Brief description: A naturally aerated bin system using three covered concrete bays operated in series, with turning and materials transfer by front end loader. Product is sold by the trailer load and in bags.

Contact: Richard Adgo: Ph: 04-477 3888; Fax: 04-478 4711

Paraparaumu: Otaihanga Landfill, Otaihanga Rd., Paraparaumu

Operator: Composting New Zealand Ltd

Raw materials: Green waste and bark

Brief description: An outdoor windrow system with mechanical agitation. Products are sold from the site in bulk, by the trailer load and in bags.

Contact: [Brendon Mallia](#), Ph: 021 620 190



Marlborough District:

Blenheim: Blenheim refuse station.

Operator: Green Fingers Partnership.

Raw material: Green waste.

Brief description: Outdoor windrow system with mechanical agitation. Compost marketed retail and wholesale.

Contact: Julie and Howard Williams, Fax: (03) 577 9114

Canterbury Region:

Ashburton: Ashburton Resource Recovery Park, McNally St, Ashburton.

Operator: Wastebusters Ashburton

Raw materials: Green waste.

Brief description: An outdoor windrow system with mechanical agitation. Screened compost is presently stockpiled.

Contact: John Scott; Ph: (03) 308 0160

Christchurch: Bromley metro refuse centre.

Operator: Christchurch City Council (trading as Garden City Composting).

Raw material: Green waste.

Brief description: Outdoor windrow system with mechanical agitation. Compost is marketed whole sale by tender.

Contact: [Tony Moore](#)





Christchurch: Factory Rd, Belfast.

Operator: PPCS Ltd.

Raw materials: Primary and dissolved air flotation sludges from meat processing wastewater treatment, combined with bark.

Brief description: An aerated static pile (Rutgers type) process, followed by maturation in windrows. Finished compost is sold in bags and in bulk under the registered name "BioBlend", from a contracted supplier,

Contact: [Graeme Keeley](#) (technical enquiries);

Geraldine: Geraldine Organic Centre

Operator & Owner: Perry Environmental Ltd

Raw Material: Green waste / paunch grass

Brief description: An outdoor windrow vermiculture system. Processing 5,000 tonnes per year. Sales to horticulture, agriculture, cropping, landscaping and domestic users.

Contact: [Peter Higgs](#); tel. +64 7 829 9678; Websites: www.perry.co.nz and www.revitalfertilisers.co.nz

Kaikoura: Resource Recovery Centre, Scarborough Tce.

Operator: Innovative Wastes Kaikoura Ltd.

Raw materials: Green waste (food waste under trial).

Brief description: An in-house developed in-vessel horizontal composting unit (HCU). The reactor comprises a semi-continuous, covered long bin, located on a concrete base. Daily turning and moving of material is carried out using an excavator. Finished



compost is primarily used as potting mix and bedding material for an associated tree nursery.

Contact: [Ian](#) Challenger; Phone: +64 3 319 7148



Rakaia: Rakaia Resource Recovery Park, West Town Belt, Rakaia.

Operator: Ashburton District Council.

Raw materials: Green waste and food residuals.

Brief description: Food waste is pulverised in a hogger and transferred to an agitated concrete bay for hot composting. The material is then vermi-composted in windrows and the final products sold.

Contact: [Johan Fick](#)

Twizel: Ostler Road, Twizel.

Operator: Mackenzie District Council.

Raw material: Green waste, food wastes and fish processing wastes.

Description: A vertical in-reactor composting system. Commissioned in 2002.

Contact: [Catherine Johnstone](#); Website: www.mackenzie.govt.nz/rrps/Contents.htm



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Southland Region:

Gore: Miro Street, Gore.

Operator: Gore District Council, trading as Mirata Services.

Raw materials: Green waste collected from the parks & garden activities.

Brief description: A series of compost bins, the product will be used on the council garden plots.

Contact: [Antony Clark](#)

Invercargill City: Solid waste transfer station, Bond St.

Operator: Invercargill City Council and Bond Contracts.

Raw Material: Green Waste.

Brief Description: Shredding and windrowing system. The compost product is used for restoration of a landfill site.

Contact: [Tom Greenwood](#) or [Russell Wood](#)

Appendix B

Greenwaste Shredder for Sale



German made Husmann Greenwaste shredder.

Very good condition, only 130 hours on clock.

Approx 50-60 m³/hour capacity, 130 mm material diameter.

Loaded with small excavator or loader.

Equipped with an optional finer shredding screen.

Easily towed with ring-feeder type hitch and air brakes.

Effective and affordable Greenwaste shredding for smaller centres.

Enquires phone Peter, 03 476 1943, mcdale@xtra.co.nz

