

Green Waste Disposal alternatives to burning

Options Analysis

A cost comparison for dealing with the Shire of Denmark resident's Green Waste has been requested. Regardless of the option chosen by the Shire, an additional crew member or a re-assessment of tip management is required, including to begin charging for green waste receipt. In any of the below scenarios, there is a requirement for contamination to be managed to avoid un-necessary costs to be incurred during the processing of Green Waste.

The following assumptions are made in all of the below scenarios:

- An annual green waste production of no more than 6000m³
- Assuming 2,500 residents in the case of a kerbside pickup
- A license amendment will need to be sought from the DWER in order to mulch green waste on site- the current license limits the annual volume of greenwaste to 1000 tonnes if mulching.

OPTION 1: Cease acceptance of Green Waste at the McIntosh Transfer station

The result of this option would be increased dumping and increased burning of Green Waste in backyards. It is in no way realistic to expect people to drive to neighbouring councils to dispose of Green Waste.

OPTION 2: Shire transport of Green Waste to an alternative site for processing

Hire of contractor to mulch green waste to a size more reasonable for transporting and the cost of having hook lift bins delivered to Albany compost facility. Quotes were obtained from two contractors, however the scenario below was the most cost efficient due to the processing capacity of the equipment.

Activity	Cost per annum ex GST
Un-mulched Transport of Green waste to Albany (each skip holds 24m ³ , therefore requiring 250 trips per year. (\$265.00 X 250)	\$66,250
Purchase of 2 skip bins @ \$16,000 each	32,000
Mulched- cost of transport assuming a third of the volume green waste after mulching (assuming 84 trips) (\$265 x 84)	\$22,260
Wet hire of horizontal grinder (production rate of 160m ³ per hour) (6000 m ³ /160 = 38 hours)	
Hire cost= 150/hr (150x 38= \$5,700)	\$5,700

Processor cost= 480/hr= 480x38	\$18,240
Mobilisation charge= \$1,000/instance and assuming 4 instances of mulching	\$4,000
Cost for receipt at compost facility in Albany @ quoted \$13.20 per m3 (assuming current GW production of 6000 m3 per annum)	\$79,200
Cost for receipt at compost facility in Albany @ quoted \$13.20 per m3 (assuming a third of the volume of current GW production- 2000 m3 per annum)	\$26,400
Cost of bin purchase in first year	\$32,000
Total without mulching per annum	145,450
Total with mulching per annum	\$76,600

OPTION 3: Removal of Green Waste from McIntosh Transfer station by contractor

Contractor to collect raw green waste on site at McIntosh Waste Facility and transport to processing site. Based on the assumption that Shire of Denmark will provide a loader to load the truck. The truck holds 120m³ and therefore Shire would require approximately 50 pickups a year.

Activity	Cost per annum ex GST
Staff member to operate loader- 60 hour @ \$100 p hour (assuming mulching 6000 m3 at 100m ³ per hour)	\$6,000
Green Waste collection by contractor @ \$795 per removal @ capacity of 120m ³ per removal = 795x50	\$39,750
Front end loader use-assuming availability of Shire's loader and assuming a total of 60 hrs required time & in-house hire cost of \$231/hr	\$13,900
Fuel cost- front end loader (\$30/hr x 60 hrs)	\$1,800
Cost for receipt at compost facility in Albany @ quoted \$12 per m3 (assuming current GW production of 6000 m3 per annum)	\$72,000
TOTAL	\$205,450

OPTION 4: In-house kerbside pickup service

A kerbside collection service provided by the Shire or a contractor would require purchase of bins for each household that is currently receiving a rubbish service.

The following two scenarios do not consider the cost that may be associated with bin damages and replacing bins as this would be a Shire cost. It is assumed that this operation can be done by using the current fleet or with a future contractor.

Activity	Cost per annum ex GST
Bin purchase (2,500 services @ \$80.00/bin)	200,000
Additional tip officer time required for extra bin pickup Assuming monthly pickup and 37 hrs required to complete all properties @ \$100 per hour (based on current bin collection schedule)= 3,700 per month	44,000
Fuel costs of bin run and transport to Albany (assuming fuel cost @ 1.45 p/L) (consumption @ 1.13km/1L) assuming 1,500 km travelled per week. 1,500km/1.13km= 1,328 L per month= \$1,925 per month	23,100
Cost for receipt at compost facility in Albany @ quoted \$13.20 per m ³ (assuming current GW production of 6000 m ³ per annum)	79,200
Additional vehicle maintenance costs (Assumed at 1/4 of the current maintenance costs (average over 5 years = \$45,000 per year less insurance) 40,000/4	10,000
TOTAL for first year	\$356,300
TOTAL for each year thereafter	\$156,300

OPTION 5: Kerbside pickup service by contractor

The cost of receiving green waste at the compost facility is included in the contractor kerbside pickup.

Activity	Cost per annum ex GST
Bin purchase (2,500 services @ \$80.00/bin)	200,000
2,500 residents at \$3.60 per bin collection (\$9,000 per month) monthly service.	108,000
Transport from Denmark to Albany @ 2.43 per bin	6,075
Process of greenwaste @ 2.88 per bin	7,200
TOTAL for first year	\$321,275
TOTAL for each year thereafter	\$121,275

NB:

- A third bin collection could be presented as an 'opt in' service and therefore bins are paid for and owned by the resident, releasing the Shire of this cost.
- The above two cost scenarios do not include the green waste collection from Denmark Waste Management & Reuse Facility for those residents that will not receive a kerbside pickup.

- These costings also do not consider costs associated with a community engagement plan. Community engagement will be essential for the success of a third bin collection service and must be completed prior to roll out of the service.

OPTION 6: Bulk verge collection service by contractor

This option involves a contractor conducting bulk verge pickups of all verges where residents currently receive a kerbside rubbish collection. It includes the full cost of pickup, transport and receipt at the compost facility.

Activity	Cost per annum ex GST
Bulk verge collection by contractor for 2,500 residents (\$8000 per pickup, 3 pickups per year)	24,000
Cost for receipt at compost facility in Albany @ quoted \$12 per m ³ (assuming current GW production of 6000 m ³ per annum)	\$72,000
TOTAL	\$96,000

OPTION 7: Composting Green Waste using open windrow system

Process employed for composting compliant with Australian standards:

- Open windrows (uncovered) with daily monitoring checks of windrow conditions including O₂, CO₂, H₂O and temperature.
- Each windrow is required to undergo a pasteurisation phase where the windrows must be turned a minimum of 5 times following formation with the trigger point for turning being either low O₂ or the windrow's core temperature holding a minimum of 55 degrees celsius for 3 consecutive days.
- The greater number of turns employed, the greater the consistency with thorough pasteurisation of the entire windrow.
- Moisture is added throughout the process via surface irrigation of the windrow to maintain optimum moisture.

Once site operators believe the product has undergone sufficient turns and the product appears well mixed and contents have consistent composted appearance (usually after 5 -6 turns), the material is sampled and sent to laboratory for analysis.

If/where the windrow meets targeted quality criteria, the windrow is then screened to 10 or 20mm – and stockpiled for maturation awaiting public sale.

Table A: Start-up capital expenditure Ex GST

Item	Break-down	Total cost
Purchase of Australian Standard 4454-2012 Composts , soil conditioners and mulches		\$214.00
Purchase of excavator		\$40,000
Site works to grade area	Grade area=2 hrs @ \$231 + \$84=\$630 Gravel= 39m3 @ \$9.55 (transport) and \$10 (royalties)= \$780 Form bund = 2 hrs @ \$184 + \$84 = \$536 Construction of drainage pond= \$1,750	\$3,700
Signage		\$1,500
Power generator	Cost provided by consultant	\$25,000
Water supply		\$30,000
Testing equipment (oxygen probes etc)		\$4,000
Electrical supply		\$21,000
Hardstand		\$34,100.00
Leachate pond		\$25,080.00
Pumps and reticulation		\$34,100.00
Aerator		\$109,450.00
		\$328,144

Table B: Operational expenditure Ex GST

Item	Break-down	Total cost
Additional Tip Officer	(\$100/hr x 5 hours) x 5 days per week= \$2,500 per week	\$130,000.00
Wet hire of horizontal grinder (production rate of 160m ³ per hour) (6000 m ³ /160 = 38 hours)		\$5,700
Hire cost		
Processor cost	150/hr (150x 38= \$5,700)	
	480/hr= 480x38	\$18,240
Mobilisation charge	\$1,000/instance and assuming 4 instances of mulching	\$4,000
Trommel screen hire	\$350/day x 4 per year	\$1,400.00
Hire of front end loader (required to load tub grinder)	\$231/hr x 38 hours	\$8,778
Fuel costs		
Excavator	\$30 per hr/8 hrs per month/ 12 months per year	\$2,880.00
Front end loader	\$30 per hr/3 hrs per week/ 52 weeks per year	\$4,680.00
Trommel screen	\$25 per hr/6 hrs per load/ 12 loads per year	\$1,800.00
Vehicle Maintenance		
Excavator maintenance		\$15,000.00
Front loader maintenance		\$12,000
Groundwater monitoring of bores	\$300 per sample @ 4 p/year	\$1,200.00
laboratory analysis costs (sending sample to laboratory before sale)	\$40 per sample (4 sample per year)	\$160.00
License amendment requirement	\$764 per annum	\$764.00
		\$206,602

The above costing includes the addition of a tip officer. Contamination of Green Waste will make the process of composting much slower and more costly. The issue of contamination will have to be addressed and would require higher level of attention and time from tip officers and likely an extra tip officer to supervise vehicles dropping Green Waste off, therefore this has been included as a cost in this scenario.

OPTION 8: Biochar production

This would require the Shire to build a pyrolysis plant which will cost \$2.5 – \$8 Million in capital and would require a consistent load of feed (Green waste). The process of producing biochar also produces other bi-products; oil and syngas which will require a market to sell. Running costs would vary considerably depending on the size of the facility but would need to be manned constantly and would require considerable approvals from Government.

A biochar facility is a multi-million dollar project in any case, but ultimately decisions to build a facility would be made based on an analysis of the market for the products made.

Option: deliver Green Waste to a facility in the South-west. Eg, Verve Integrated Wood Processing (IWP) Plant Narrogin, Western Australia. The opportunity to develop a composting site as a joint venture of the Regional Waste Alliance can also be investigated.

Summary

Option		Costs \$	Advantages	Disadvantages
1	Cease acceptance of Green Waste	Costs associated with increased dumping and increased burning on properties	<ul style="list-style-type: none"> Shire would no longer have to plan burns or use machinery to push up piles 	<ul style="list-style-type: none"> Increased dumping of green waste in natural areas Increased burning of green waste on private properties Unacceptable considering best practice waste management.
2	Shire transport of Green Waste to an alternative site	Mulched/un-mulched: \$76,600/\$145,450	<ul style="list-style-type: none"> Most cost effective option assuming green volume will be reduced by 1/3 when mulched and not taking into account other costs associated with handling. 	<ul style="list-style-type: none"> Double handling of green waste as it would be required to be mulched prior to being placed in skip bins. <p>Extra costs:</p> <ul style="list-style-type: none"> Purchase of skip bins and mulching of green waste. There is a likelihood that bins will fill up very quickly without being mulched first. Will also need to extend the current platform for waste drop off to allow access to green waste skips. Cost of transporting greenwaste to skip bins from main pile once it has been mulched
3	Removal of Green Waste by contractor	\$205,450	<ul style="list-style-type: none"> Does not require any additional space or site works to be completed 	<ul style="list-style-type: none"> Costly option due to the requirement for Shire resources Based on the availability of a Shire front end loader and operator at the time of filling the truck
4	kerbside pickup- In house	First year: \$356,300		<ul style="list-style-type: none"> High risk of loads being rejected at the composting facility due to the likely,

		Each year thereafter: \$156,300		<p>very high contamination rate observed in kerbside bins.</p> <ul style="list-style-type: none"> • Low cost effectiveness of the options that take green waste off site • Will require an additional truck driver to do pickups • Possibility that a large portion of green waste will not fit in bins and will end up at the McIntosh Transfer station regardless. • Least cost effective for a kerbside pickup
5	Kerbside pickup-contractor	First year: \$319,175 Each year thereafter: \$119,175	<ul style="list-style-type: none"> • The Shire will not be responsible for contamination of rubbish bins. • Most cost effective for a kerbside pickup • Very positive and responsible move towards better waste management practice that aligns with the Strategic direction of 'closing the loop' and the circular economy. 	<ul style="list-style-type: none"> • Green waste will still need to be removed from the transfer station as this option only caters for those people who already have a kerbside service. • Extra bin to be managed by the Shire • Costs for bin replacement or damages • This option is best used in conjunction with other green waste management scenarios.
6	Bulk verge collection service by contractor	3 pickups per year: \$96,000	<ul style="list-style-type: none"> • Manages contamination • Does not require input from the Shire for operations and minimal administrative input. 	<ul style="list-style-type: none"> • Low cost option however green waste will still need to be removed from the transfer station as this option only caters for those people who already have a kerbside service. • Administration time to answer inquiries
7	Composting Green Waste	First year: \$328,144 Each year thereafter: \$206,602	<ul style="list-style-type: none"> • Green waste dealt with on site • Possibility of making a profit on the product 	<ul style="list-style-type: none"> • Large upfront costs and large operational costs • The analysis does not consider the cost involved with disposing of general waste sifted from the pile.

				<ul style="list-style-type: none"> · · Would require extra space to be created on site · Require strict procedures for receipt of green waste and would require machinery and operators on site each day to manage piles. · Contamination would be a major issue that needs to be managed. Proximity to a landfill site will also be an issue depending on whether a third bin is implemented in Denmark. · Would require a feasibility study to be completed by a consultant
8	Biochar	Not known	<ul style="list-style-type: none"> · Possible production of a marketable product 	<ul style="list-style-type: none"> · Would require significant investment upfront · Would require a feasibility study to be completed by a consultant which includes an assessment of the market and a possible pilot study to confirm if there is a market and what type of market this is